The Business Journal of Vegetation Management February 1978/$1.25

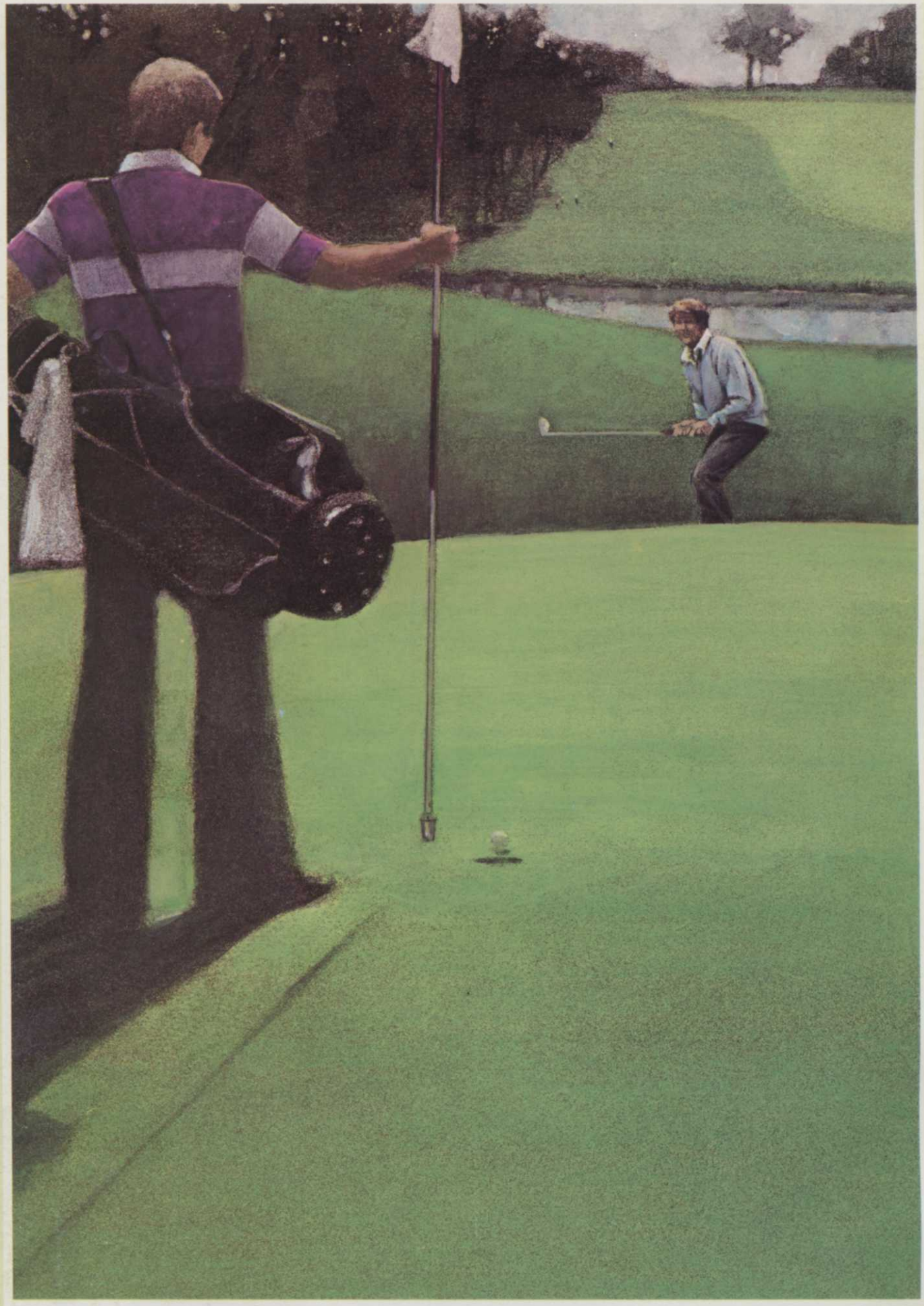
WEEDS TREES & TURF

Comparison of Preemergent Turf Herbicides

Direct Mail Promotion, Boost to Spring Business

Mite Attacks Turf in Winter

Adult Winter Grain Mite



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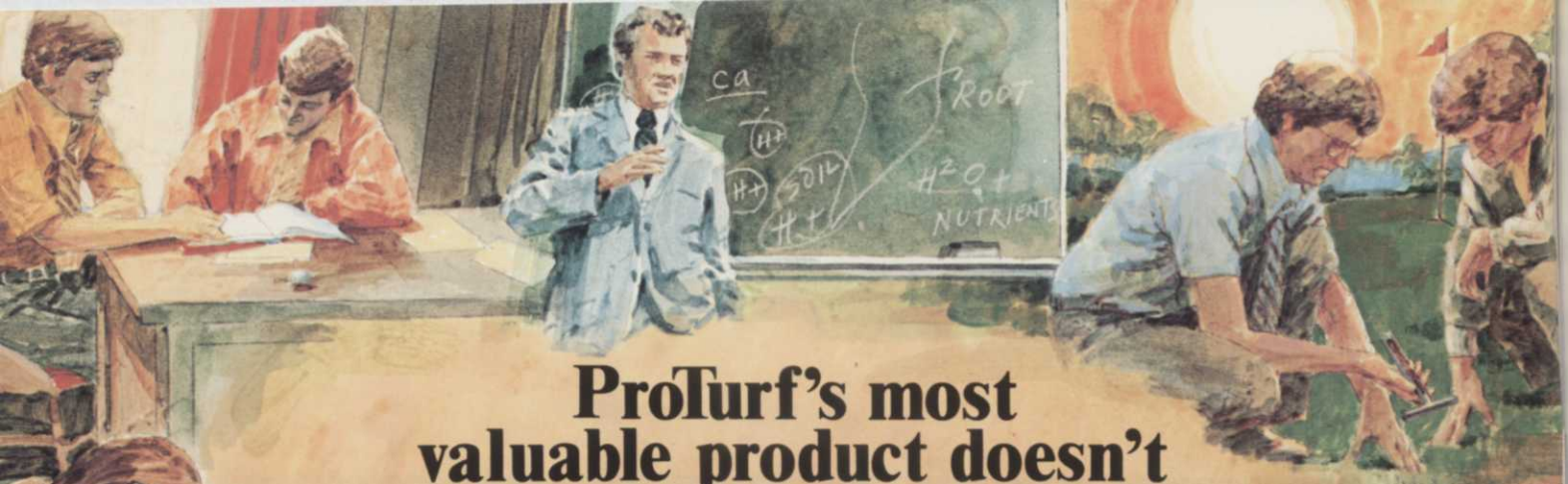

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ProTurf sells nearly fifty fertilizers, fungicides, herbicides, insecticides, combination fertilizer/pesticide products, seed varieties and blends, and mechanical equipment. Every product in the ProTurf line was designed to help grow healthy, beautiful turfgrass effectively...and economically.

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The seed that's changing the face of America.

Pennfine Perennial Ryegrass

The biggest breakthrough in the greening of America began in 1970. That's when turfgrass specialists at Pennsylvania State University completed development of a remarkable fine-leafed perennial ryegrass with all the advantages of ryegrass. And none of the drawbacks. They called it Pennfine.

Now, just six years later, the success of their undertaking is evident. On golf courses and athletic fields. In parks and cemeteries. And on public grounds across the country.

Proven in tests. Among the nine perennial ryegrasses tested over a five-year period at University Park, Pennsylvania, Pennfine ranked finest in texture. Most resistant to disease. First in density and decumbency (low growth).

The University Park test results were only the beginning. Over 5,000 test kits with seed samples were distributed over the entire country in answer to requests from turf professionals wanting to test Pennfine. The results confirmed the University Park findings.

Most importantly, Pennfine established a new standard of mowability. Some other perennial ryegrasses, cut with the same mower, left ragged, fibrous tops that quickly turned brown. Pennfine's softer fibers cut smooth and clean.

Proven from coast to coast, from North to South. Pennfine's durable beauty has been demonstrated at prestigious sites all over America. From the lawns at an historic national landmark to the greens at a nationally-renowned golf course.

Besides possessing the ability to stand up under heavy traffic, Pennfine germinates rapidly. That makes it ideal for winter overseeding in the South. And, its non-competitiveness allows a smooth spring transition to bermudagrass.

Proven quality control under the Plant Variety Protection Act. You can be sure that all Pennfine Perennial Ryegrass meets the same high standards, because Pennfine is covered by the Plant Variety Protection Act.

That means every pound of Pennfine is certified. You are assured, by law, that it's produced exactly as intended by the original variety breeder.

Prove it to yourself. To learn more about how Pennfine is changing the face of America—and how it can work for you—write: Pennfine, P.O. Box 923, Minneapolis, MN 55440.

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VIEWPOINT

The response to the call for questions has been terrific!

Numerous good suggestions have arrived on the postpaid reader comment cards. As a result, we are in the process of planning and arranging articles on liquid fertilization, dethatching, and many other topics. A regular column listing current research was also recommended and will be implemented in the near future.

We extend the invitation to you to write Weeds Trees & Turf with article suggestions and questions you may have. The authors of the problem-solving columns now have the first set of questions from the cards and these answers will appear in the next few issues.

The questions will be answered on a timely basis. Seasonal topics will receive priority over year-round problems. Problems of major scale may warrant feature coverage to provide adequate information. If we detect a large number of questions on a particular subject, we will construct an in-depth article on the whole subject.

Industry Advisory Board

After a thorough study of specialists in the various green industries, we have selected fourteen individuals to serve as an advisory board to the magazine. So far, every person invited to be on the Board has graciously accepted the challenge. A complete list of Board members will appear in the March issue.

The formation of the Board completes the basic reorganization of the magazine to better serve the industry. This job was taken on to increase reader involvement in the publication and thereby increase its usefulness to you, the reader.

My last goal, as mentioned in the October '77 issue, is to bridge the researcher/layman gap. The research notes feature will serve as the initial take-off point for this objective. From this monthly column, we will build the middle ground needed to get the message of progress to the professionals that put it to work. Hopefully, this column will also encourage feedback from the field so that researchers will have the most accurate information of what occurs in practice as opposed to in experiments.

Now that we have built a good reader/editor relationship, the Viewpoint column will become what it was designed to be, a place for comments to appear. From time to time, I might use the column as an open letter to readers, but not as often as I have recently.

BRUCE SHANK
Editor

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LETTERS

Your December issue arrived today and needless to say, I am most disappointed that you failed to list the Florida Turf-Grass Association Annual Meeting. We are an organization, one of only 6 in the country, which encompasses the entire turf industry, not just sod, turf, seed or golf courses.

Our last Conference and Show was held October 16-19, 1977 in Orlando. We had 125 booths representing over 60 national manufacturers and over 750 turf managers came from all over the United States and several foreign countries to attend. We are the largest warm season grass conference and show in the world.

It seems that the damage is already done and since the listing will not appear until next December and our Annual Conference and Show will be in October, I would hope that you will see fit to list our meeting in some future issue.

The 1978 meeting is scheduled for October 15 - 18, 1978 at the Sheraton Towers Hotel, Orlando, Florida.

Nona Murphy
Executive Secretary
Florida Turfgrass Assoc., Inc.
Orlando, Fl.

We apologize for the oversight. As I said in the December editorial, some mistakes were inevitable. It's unfortunate that such a major meeting was left out. Let me assure you that the 1979 Directory of Trade Shows will include the Florida Turfgrass Association's meeting.

I took note of your October issue, "Trees in the City." Since I have been involved with the treatment of tree ailments for nearly 50 years, I have a strong feeling there is a wide field in the artistic topping of trees.

Ever since the awareness of the usefulness of fast-growing trees, there has been the awareness of the need to keep them within bounds. Most of the topping treatment of trees today is done from the bucket of a snorkel truck. Nevertheless, too many trees in the eastern United States are overextended to the point of dieback.

When the arborist operator demonstrates to the tree owner that he can cut the owner's cherished old hard maple 10 feet, and do it artistically (where the cut is obscured by other foliage and the completed tree top is as symmetrical as the neatly trimmed bush at the doorstep) then, I think attention to the care of trees will show more impetus.

John Thornhill, Arborist
Hampshire, Ill.

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Versatile Terra Tack can be used with straw, hay or wood fiber mulch.

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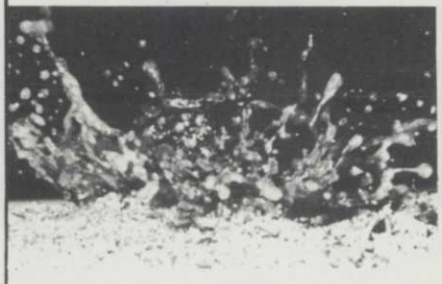

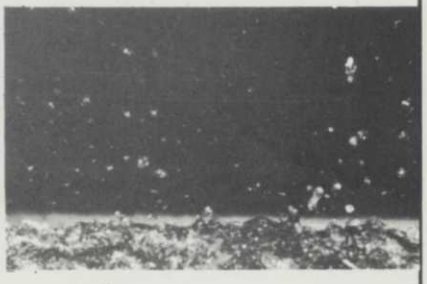

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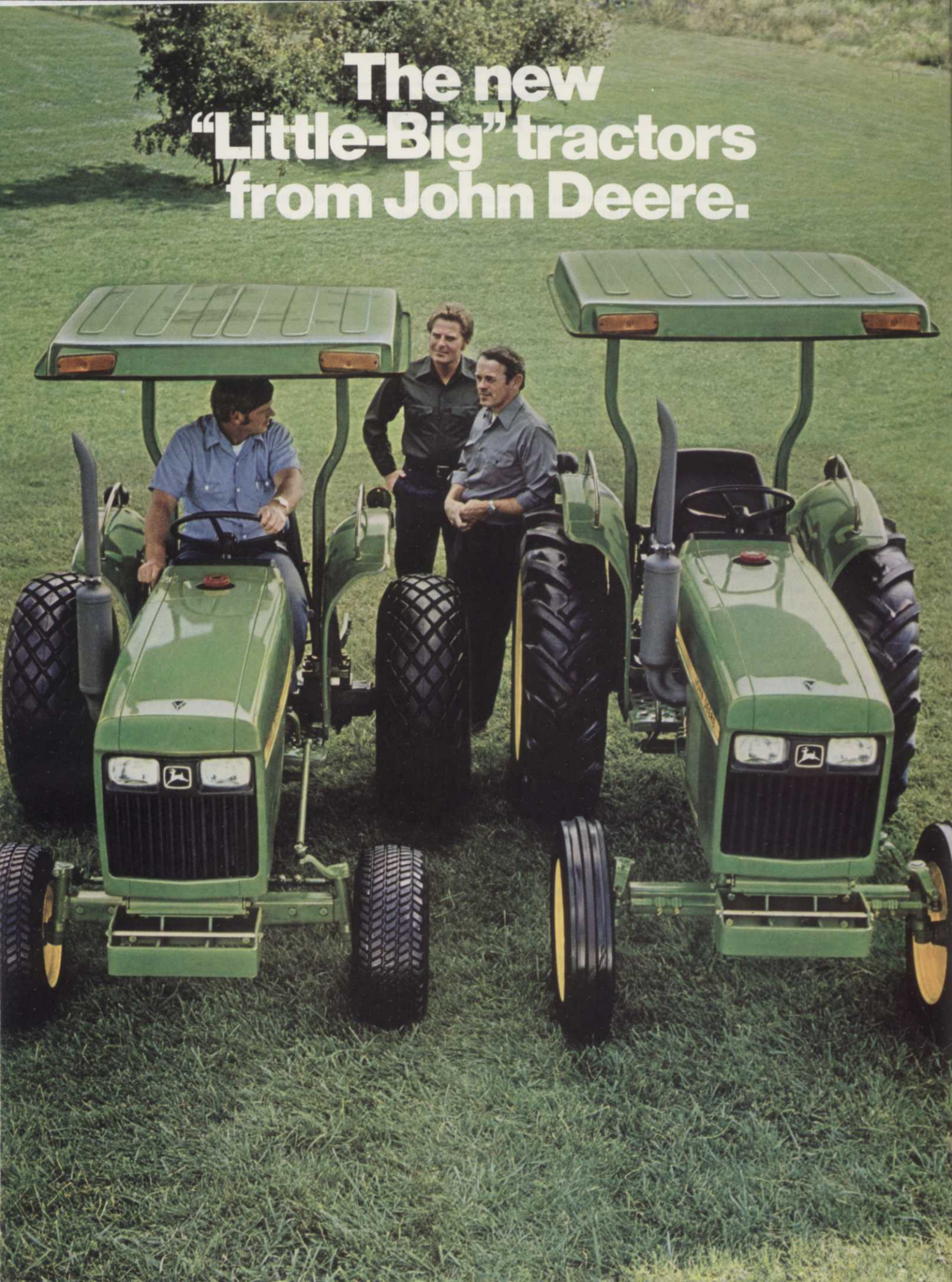
The new
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Liquid-cooled 22 or 27 PTO hp diesels that are big enough to do all the jobs you need to do. Yet small enough so you can afford them.

If the jobs you have are too big for a lawn and garden tractor and too small for a farm or industrial tractor, John Deere has the tractor you need. In fact, two of them. The new John Deere 850 and 950 Tractors. Rugged. Reliable. And built to handle the jobs you'll give them.

Big-tractor features. Under each tractor's lift-up hood is a liquid-cooled, fuel-efficient diesel engine: 22 PTO hp for the 850, 27 PTO hp for the 950. Both tractors have smooth-running transmissions with 8 forward speeds, 2 reverse. Speeds are well-spaced from less than 1 mph for tilling to almost 12 mph for transporting.

Other big-tractor features are standard. There's a differential lock that engages on-the-go for added traction in slippery conditions and a fully shielded 540-rpm rear PTO. Individual rear wheel brakes lock together for highway transport and lock down for parking. A heavy-duty drawbar adjusts to four positions. Hand and foot throttles are both standard. Integral equipment easily attaches to a 3-point hitch (Category 1). The adjustable, fully cushioned seat tilts forward for weather protection.

Big-tractor versatility. You can match the 850 and 950 to your jobs. Wheel tread width adjusts front and rear. Ground clearance is nearly 14 inches under the 850—more than 15 inches under the 950. Maneuverability is superb since both tractors will turn within a 10-foot radius. So whether you're mowing, loading, plowing, digging, planting, or cultivating—these tractors can handle the job.

Service you can count on. Your John Deere Dealer is always ready to help. Service training schools for the 850 and 950 have already been completed. And a complete inventory of service and replacement parts is ready.

So stop by and see your John Deere Dealer soon for the complete story behind the new "Little-Big" Tractors. Or for free literature write to: John Deere, Box 63, Moline, Illinois 61265.

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50 Utility Box Scraper	100 Integral Disk
31 Integral Disk	205 Rotary Chopper
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JOHN DEERE

GREEN INDUSTRY NEWS

GOLF

USGA reorganizes headquarters staff

The United States Golf Association has reorganized it headquarters staff. Overall direction of the association remains the responsibility of Executive Director P. J. Boatwright, Jr., but former Assistant Director John D. Laupheimer has assumed the new position of deputy executive director with direct responsibility for administrative activities. His areas of authority include the USGA Associates Program, the Green Section, public relations and communications, and membership. Frank Hannigan retains the duties and title of assistant director for special projects.

The changes were made because "the organization is growing, and we felt a need to better define the functions within the organization. These are now defined according to directors," Laupheimer said.

The new system groups administrative functions into five departments, each supervised by a director. They are:

Rules, amateur status and conduct, handicapping, competitions — Tom Meeks, formerly regional director.

Membership and services, Green Section, regional affairs — Charles W. Smith, formerly administrative assistant in rules, handicapping, Green Section, and membership.

Implements and ball — Frank Thomas, formerly technical director.

Administration — James T. Reilly, formerly controller.

Communication, public relations, Associates Program — a new director has been hired, but was not to be announced until February 1. Robert Sommers remains as manager of publications and chief editor of Golf Journal, the USGA magazine.

The recent change in Golf Journal — becoming a totally nonprofit magazine, without advertising, published in-house by the USGA — was cited by Laupheimer as another factor in the staff reorganization.

Signing the FMC/Iseki agreement were, (seated from left) T. Toyotama, Managing Director of the Research & Development Division, Iseki, and Robert E. Purcell, Vice President, FMC Corporation. Witnessing were, standing from left, David L. Hill, Outdoor Power Equipment Division Manager; A. L. Schmitz, Director, International Business Planning & Development, FMC Corporation; Robert E. Bergen, Assistant Manager, Outdoor Power Equipment Division, and seated, R. H. Utsunomiya, General Manager, Overseas Division, Iseki.

CHEMICALS

Scientists identify 5,000 needed uses

A group of state agricultural experiment station scientists have identified 5,000 nursery and florist uses of agricultural chemicals which are not currently registered.

The scientists, participating in the IR-4 program, assist in the registration of agricultural insecticides, fungicides and herbicides by interceding with the Environmental Protection Agency. A survey by the American Association of Nurserymen identifying specific pesticide needs of wholesale growers was used by the scientists in compiling their list.

The scientists, who make up an advisory committee to the IR-4 program, are Richard Guest of Rutgers, USDA plant physiologist Ray Frank, Charles Powell of Ohio State University, and Richard Lindquist who is an entomologist with the Ohio Agricultural Research and Development Center.

EQUIPMENT

FMC will market Japanese tractor line

FMC Corporation, Outdoor Power Equipment Division, manu-

facturers of Bolens lawn and garden equipment, has entered into a long term engineering and marketing agreement with Iseki Agricultural Machinery Manufacturing Company, Ltd., Tokyo, Japan, for a line of medium horsepower water-cooled agricultural tractors, designed for both U.S. and Canadian markets.

According to David L. Hill, Manager of the Outdoor Power Equipment Division, Iseki is the largest exclusive agricultural machinery manufacturer in Japan, with over 8500 employees at 6 locations. Iseki, which is estimating 1977 sales to be $470 million (U.S.) celebrated its 50th anniversary in 1975. FMC and Iseki also have technical cooperation with another one of FMC's divisions and are currently exploring other wide range cooperative agreements.

Hill noted that deliveries of the new Bolens/Iseki tractors would commence early next year.

LANDSCAPE

Most landscape firms charge for plans

Most landscape firms charge their customers for working up landscape plans, according to a recent survey conducted by the National Landscape Association. The survey, covering charges for landscape plans and specifications, brought 157 responses.

Eighty-six percent of the responding firms indicated that they do charge for such plans. Of those, just over 75% give some allowance for the plan's cost if the landscape plants are purchased from their firm.

Sixty percent of the firms charging for their plans reported using a flat fee, that might, however, vary with the size of the project, complexity or kind of job. Some firms reported charging a smaller fee if the project could be completed on the basis of a landscape "sketch" rather than a detailed drawing.

The average flat fee was $62 per plan with prices ranging from $15—550. Most firms reported $25-50 fees for the simple plans and $150-250 for the more complex.

Approximately one-fourth of the respondents indicated an hourly charge for time spent creating a landscape plan, with an average rate of $18.50/hour. Charges varied from $10-50. When the principal or senior landscape architect prepared the plan, some firms indicated a higher rate, ranging from $30-50/hour.

The remainder of the firms which reported charging for landscape plans and specifications based their fee for plans on an average of 9.4% of the estimated total project cost. This percentage charge ranged from 3-20%, with 10% being the most common.

TREE

Top 20 trees derived from study

An Ohio State University faculty member has released a list of the 20 top trees for urban use based upon a ten year evaluation of more than 140 shade and ornamental trees.

From first to tenth place are:
Bloodgood London Planetree
Red Sunset Red Maple
Dwarf Korean Callary Pear
London Planetree
Pallida Common Linden
Snowdrift Crabapple
Upright and Columnar
European Hornbeam
Chancellor Littleleaf Linden
Marshall Green Ash
Greenspire Linden

P. C. Kozel directed the project at Secrest Arboretum and five urban settings in Ohio.

RECLAMATION

Sulfuric acid improves mine spoils

Two University of North Dakota scientists are improving mine-spoil reclamation with sulfuric acid and micronutrients. Conducting research on the problems and practices involved in the revegetation of strip-mined land in coal-bearing areas of western North Dakota, Drs. N. M. Safaya and M. K. Wali of the University of North Dakota's Project Reclamation, presented a paper on the topic at the American Society of Agronomy meeting in Los Angeles.

Safaya and Wali found that they obtained better results from sulfuric acid, in comparison to gypsum, as an amendment for calcareous sodic mine-spoils. A sodic soil contains sufficient sodium to interfere with the growth of most crop plants. The sulfuric acid, in addition to improving the physical condition of the spoil, has the added advantage of making bound phosphate available to plants. Most of the spoils have extremely low available phosphorus, according to Safaya.

Pete Martin, (left) recipient of the Richard Duke Memorial Scholarship, is congratulated by Dr. Robert W. Miller, Vice President of ChemLawn. The Ohio Turfgrass Foundation presented this initial scholarship in honor of the late Mr. Duke, founder and Chairman of the Board of ChemLawn Corporation.

Phosphorus and nitrogen fertilization was found to be essential for adequate growth of grass-legume mixtures, but their use decreased the content of some micronutrients in plants. The dry forage yields of slender wheatgrass, oats and alfalfa, grown on phosphate-fertilized spoils, were increased by 751%, 424%, and 46% respectively, with adequate nitrogen fertilization. The response of alfalfa was further increased by 99% by providing small amounts of manganese and zinc.

Leonardite, a weathered lignite that is rich in humic acids (dark organic material), was used as a spoil conditioner. Growth of legumes was improved, but thickspike wheatgrass was adversely affected. The difference in growth response by species in response to leonardite seems to be inversely related to their calcium uptake efficiency, the two scientists said.

TREE

Red oak tested for wilt resistance

Red oak seedlings are being used to discover natural resistance to oak wilt disease by a Wisconsin researcher.

Richard Durbin, Ph.D., Disease Resistance Laboratory, University of Wisconsin, has screened 17 seedlings which show signs of resisting wilt fungus in inoculation over a three-year period.Durbin is now trying to mass produce the seedlings.

GOVERNMENT UPDATE

DuPont will fight for EBDC fungicides

E.I. duPont de Nemours and Company is attempting to rebut the EPA's notice of rebuttable presumption against registration (RPAR) of the EBDC (ethylenebisdithiocarbamate) fungicides. These fungicides include Dithane, Maneb, and Zineb, among others.

DuPont said that tests relied upon by the EPA in assessing the cancer risk of EBDC fungicides are inadequate. There is also evidence that neither EBDC or its metabolite, ethylenethiourea concentrate, will accrue or persist in man or environment in levels likely to cause chronic adverse effects, said duPont.

CAST says EPA is unrealistic

A report has been issued by the Council for Agricultural Science and Technology (CAST) accusing EPA of attempting "to blur the distinction between tumors and cancers."

EPA, according to the report, "misrepresents" the Delaney amendment to the Food, Drug and Cosmetic Act "as applying to tumors, whereas the clause refers specifically and explicitly to cancers".

CAST further states that, "because most tumors are not cancers and do not become cancers, the EPA endeavor to blur the distinction between them is scientifically questionable".

The report contends that EPA has developed a policy which holds that even small exposures to carcinogens convey a risk of cancer and if EPA is allowed to implement that policy, the U.S. will be trapped into bans on substances whose carcinogenic potential is actually very small.

The report claims that testing for potential carcinogens by using high doses can be unrealistic and remarks that the "physiological action of at least some substances is different at large doses than it is in small doses".

Several EPA staff members dismissed the report as propaganda.

Copies are available from CAST, Agronomy Building, Iowa State University, Ames, Iowa 50011.

GAO to review EPA

The General Accounting Office (GAO) has begun a review of federal agencies', including EPA's, chemical testing programs. The review was requested by Senators Kennedy (D-Mass.), Chairman, and Javits (R-N.Y.), Ranking Minority member, of the Subcommittee on Health and Scientific Research, Senate Committee on Human Resources.

The GAO is requesting information such as: type of test; cost of testing each chemical between fiscal 1976 and 78: methods used to select chemicals for testing: policy statements or regulations for assessing risks to humans of the chemicals: test coordinating procedures with other agencies: and the adequacy and expertise of personnel managing the chemical testing programs.

HORTICULTURE

Fourteen $500 grants available for research

The Horticultural Research Institute (HRT) has announced that it will have 14 Richard P. White $500 Research Grants available for the coming year. Awarded annually, the grants are used for purchasing supplies and equipment for important nursery research projects.

The HRI invites any organization conducting research which may be of benefit to the nursery industry, including state and federal research laboratories, land grant universities,forest research stations, botanical gardens and arboreta, to apply for one of the grants.

Recipients are selected on the basis of information provided on a simple one page application. "The only strings attached to the $500 grants are that the money must be used to purchase supplies or equipment and that a report on the progress and/or results of the work be made available to HRI so that we can pass it along to the industry," according to HRI President Jim Walsh.

Applications for the grants are available from the Horticultural Research Institute, 230 Southern Building, Washington, DC 20005, and must be received by May 1, 1978.

NURSERY

Credit card risky as payment in advance

A retail nurseryman who accepted a credit card as payment in advance for a special order lost out when the customer rejected the order after the plants, which required special digging, were dug and set aside for him.

The nurseryman accepted a bank credit card for the order, in excess of $200. When the order was cancelled, the customer's bank charged back to the nurseryman the full amount of the purchase. The nursery owner's efforts to resolve the problem through his own bank failed.

American Association of Nurserymen lawyers wrote to the owner's bank in an attempt to obtain information to advise businessmen concerning the possible risks of accepting credit cards in such cases.

"Based on the bank's response,"

Continues on page 72

Gordon Leishman measures the extra growth after using Jobe's Evergreen Spikes.

"My trees doubled the growth rate after I used Jobe's Spikes."

Gordon Leishman of Idle Hour Country Club, Lexington, Ky., is enthusiastic about the results he achieves after using Jobe's Spikes. Trees added four inches more growth than he expected. He used Jobe's 12-6-8 Evergreen Spikes in the fall of 1975 to help trees winter over, develop strong root systems and provide a reservoir of nutrients for spring growth. And he's been using Jobe's Spikes ever since.

Jobe's Spikes get right to the root of your professional tree care needs.

In every type of climate . . . every kind of soil from sand to heavy clay, Jobe's Spikes have proved their effectiveness.

University studies have shown that Jobe's Spikes are better than surface-applied fertilizer. And there's no danger of burning turf or excessive leaching.

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PEOPLE

The Board of Directors of Valley Crest Landscape, Inc., Los Angeles headquartered landscape & engineering contractor, has announced the election of **Jerry W. Cox** as vice president in charge of the company's San Diego office. Cox has been with the company for six years, and was the first participant of the company's executive training program. For the past one and one-half years he has been working at the company's San Diego office, and for the last year has been the branch manager. Valley Crest Landscape, Inc. operates a network of landscape and engineering offices throughout California and in Colorado and Washington, performing large-scale projects in many Western, Southern, and Mid-Western states.

Hugh Chronister

BMC Landscape, Inc., Gardena, Ca., landscape contractors, has appointed **Brian H. Flynn** as manager of operations, according to Bert M. CeDillos, chief executive officer. Flynn will be responsible for landscape and construction operations of the firm which provides diversified services to major municipal, institutional, industrial, and commercial clients in Southern California.

Flynn acquired agricultural and citrus field management experience at Newhall Land & Farming of Newhall and Santa Maria. He also managed properties for the Hansen Ranch of Camarillo. Flynn is a graduate of the University of Southern California, and has also completed two years of law studies.

Jerry W. Cox

The National Fertilizer Solutions Assoc. (NFSA) has honored **R. Hovey Tinsman, Jr.,** as "Man-of-the-Year" and **Dr. George Rehm** as "Honorary Member", at its recent 23rd Annual Convention in Dallas, Tx.

Tinsman received the honor for his generous donation of time in furthering and promoting the interests of the fluid fertilizer industry. Tinsman has served on numerous NFSA committees, been president of the association, and represented the industry before the Senate House Agricultural Committee and the Cost of Living Council.

Rehm was recognized for his research of cool and warm season grasses and for trace element work on corn. He has worked to create good communication between fertilizer producers and the association and presently serves on the group's TVA/NFSA Research and Development Task Force.

NFSA is an international organization representing more than 1,300 member companies and independent liquid fertilizer dealers.

James H. O'Brien

Norio Rock Watanabe

Dr. Fred V. Grau, president of the Musser International Turfgrass Foundation, has announced the appointment of Weeds Trees & Turf Publisher **Hugh Chronister** to the Foundation's board of directors. The Musser Foundation is a nonprofit organization, "dedicated to fostering turfgrass as a learned profession, enhancing the lives of people all over the world through turfgrass, and supporting education and research in turfgrass development and management."

Chronister is president of Cleveland-based Harvest Publishing Co., which also publishes Lawn Care Industry, Golf Business, Pest Control, and five state farm magazines. Chronister also serves as president of the Agricultural Publishers' Association, trustee of Baldwin-Wallace College, and director of the Ohio 4-H Foundation. Chronister fills the vacancy created by the death of George E. Osburn, Dec. 3, 1977.

Norio Rock Watanabe has been named president of the Kioritz Corporation of America, parent company of Echo Chain Saw. Watanabe previously served as vice president and general manager of the Kioritz Corporation of America, and most recently, has been serving in the Foreign Trade Department of the Kioritz Corporation of Japan, based in Tokyo.

Watanabe replaces T. Yokomizo as president of the Kioritz Corporation of America, who has been elevated to the position of chairman of the board of the Kioritz Corporation of America and Executive Director of the Kioritz Corporation of Japan.

James H. O'Brien has been named director of marketing and sales for the General Tree Work division of the F. A. Bartlett Tree Company, headquartered in Stamford, Conn. Prior to joining Bartlett, O'Brien had been director of marketing for International Learning Systems, manager of training for Stauffer Chemical Company, and a district sales manager for Xerox Learning Systems.

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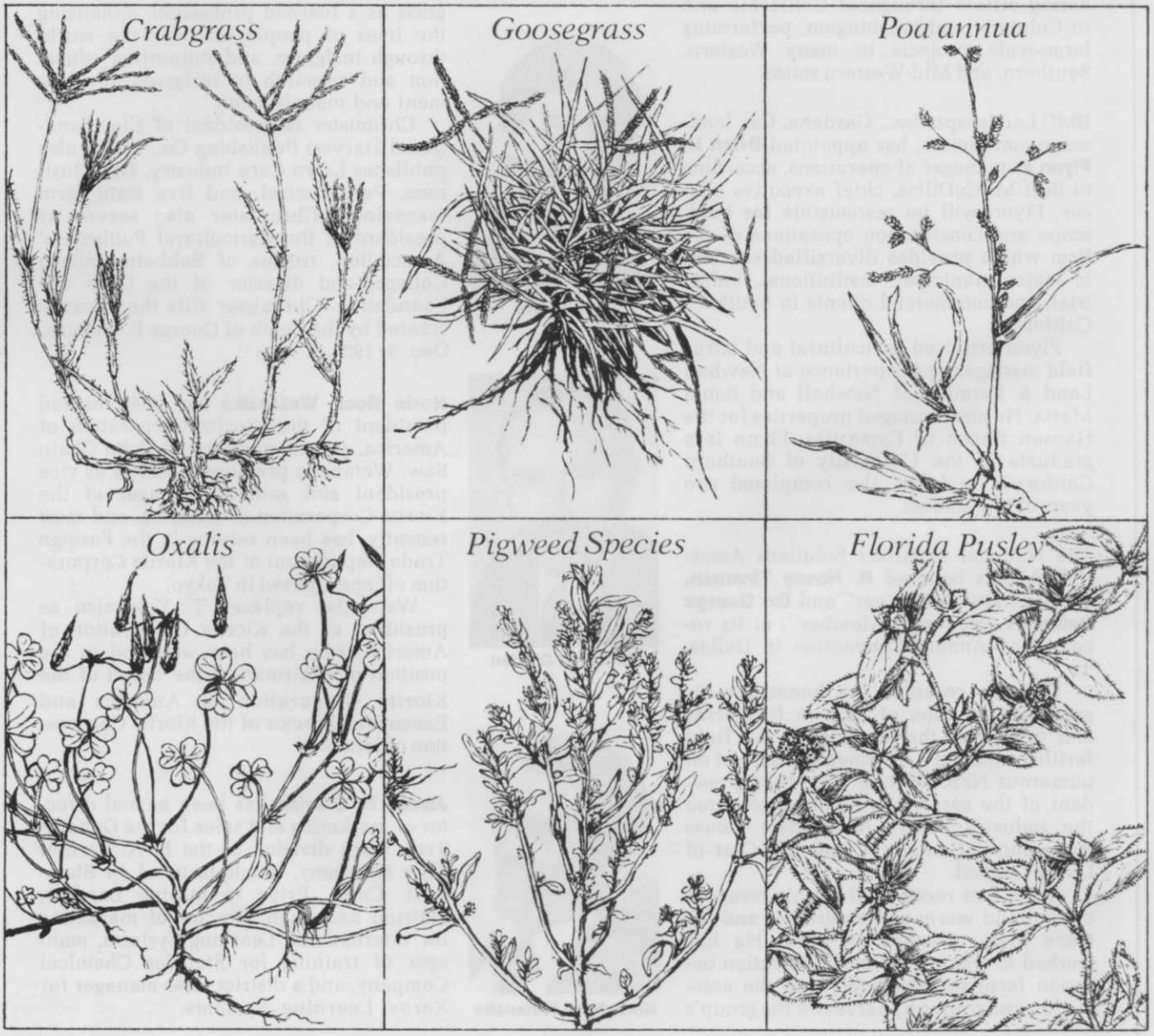

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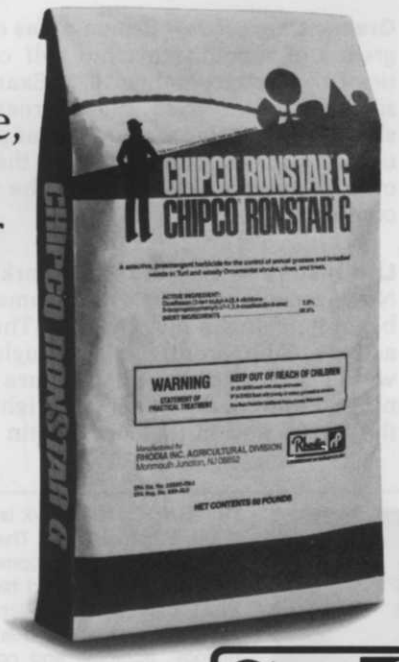

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THE WINTER GRAIN MITE WINTER PEST OF TURF

By **Dr. Harry D. Niemczyk,** Professor of Turfgrass Entomology
The Ohio Agricultural Research and Development Center, Wooster, Ohio

The winter grain mite, *Penthaleus major* (Dugés), is a well-known and important pest of small grains in the south central states. Though early literature lists bluegrass, *Poa pratensis* L., and fescue, *Festuca sp.*, as hosts, reference to this mite as a pest of turfgrass is not found. In 1969 and 70, Dr. Herbert Streu, of Rutgers University, studied the life history of the winter grain mite and was the first to collect it from home lawns, golf courses and other turf areas in New Jersey. He regarded this mite as a potentially important pest of turfgrass.

Fairways Damaged — In March 1977 a golf course in Pennsylvania reported large patches of what appeared to be winter desiccation on Penncross bentgrass fairways. Upon closer examination, extremely high populations of winter grain mite were found in the thatch and upper turf roots of these patches. Blades of grass from these areas showed evidence that the mite had fed on the surface cells, leaving a streaked appearance. Leaves severely damaged died and turned a light tan to gray color. Damage and mites appeared again in November and December 1977.

The winter grain mite has an olive-black body with the anal opening on the upper surface and 8 red legs, characteristic of this species. The body of each mite is usually filled with chlorophyll.

Greens Damaged — Brown areas on the bentgrass greens of a southern Ohio golf course were noticed in late November 1977. Examination of turf samples taken from these areas in December showed the winter grain mite was present. The golf course superintendent reported the mites occurred only in the damaged areas. The investigation is continuing.

Life History — Based on the work of Dr. Streu in New Jersey, the mites over-summer as eggs which begin hatching in late October. The new mites are active and apparently feed throughout late fall and winter whenever the temperature permits. Beginning in March, the mites lay bright orange eggs in the thatch and in the soil. Within a day or so the eggs turn white and appear shriveled. By early May the egg-laying population dies and no further mites are seen until the following October.

Feeding and Damage — Like most mites, the winter grain mite has mouthparts called chelicerae that are well adapted for rasping at plant surfaces. After removing the surface from epidermal cells, the mite sucks the cell contents into its body as food. Grass blades fed upon extensively first show a typical silvered or scorched appearance and later turn brown. Snow cover tends to accentuate areas of injury. Whether this mite feeds on turf roots is not known.

Dr. Harry D. Niemczyk is Professor of Turfgrass Entomology at The Ohio Agricultural Research and Development Center, Wooster, Ohio. He received his B. S., M. S. and Ph.D. degrees from Michigan State University. His research has dealt with all phases of biology, ecology, and control of insects in turf; emphasizing movement of insecticides through thatch, diagnosis of resistance; and the search for safe, effective insecticides.

Report Infestation — The extent to which damage from the winter grain mite occurs in late fall and winter is not known; therefore, turf managers are encouraged to carefully examine turf apparently damaged from winter desiccation or disease for the presence of this mite. If damage and the mite are found, this fact may be reported to Dr. Harry Niemczyk, Wooster, Ohio, (216) 264-2540.

No insecticides are specifically labeled for control of this mite on turf. Depending upon the extent to which this mite is reported causing injury to turf, it may be necessary to initiate research to develop methods and materials for control. **WTT**

Bright reddish orange eggs are deposited in thatch from March to May. Eggs turn white and appear shriveled soon after being laid.

Bentgrass fairways of a Pennsylvania golf course in March showing areas damaged by the mite. Courtesy Clyde Lyons.

TURF FERTILIZERS: THE TRENDS AND BASICS

Trends

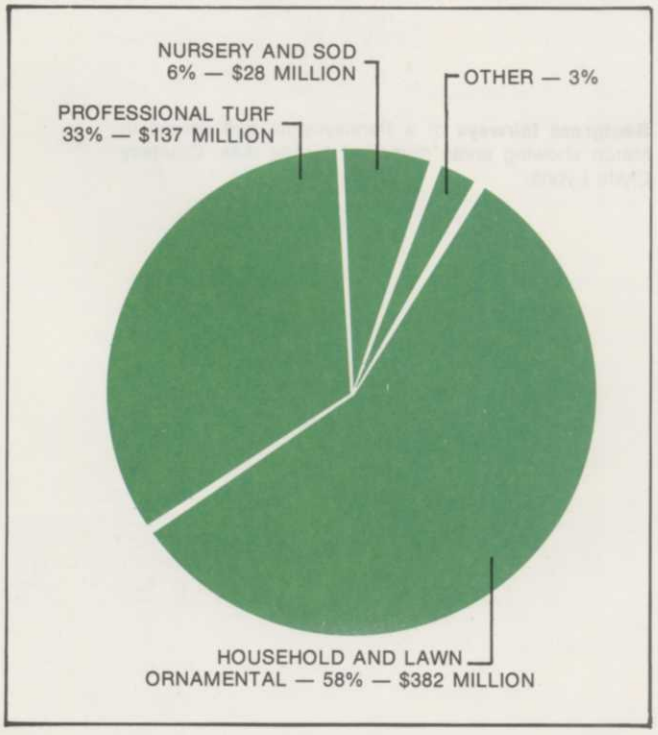
Exact statistics on fertilizer use are as hard to get as natural gas statistics from utility companies. Non-farm fertilizer statistics are even harder to find. One available study carries a $9,000 price tag.

Nevertheless, thanks to Robert Rund, secretary of the American Association of Plant Food Control Officials, we at least have some idea of non-farm fertilizer use in the United States. He undertook such a survey after The Fertilizer Institute told him of the need for such information.

Lyn Prestwich of USS Agri-Chemicals and Marilyn Messerly of O. M. Scotts & Sons presented an interpretation of Rund's results and other sources at the annual meeting of the American Marketing Association in Memphis, Tn., in October 1976. The figures are based on 1975 information.

The total non-farm market was estimated as $600 million at the manufacturers level. This total was broken into three major categories; professional turf, nurseries and sod farms, and household.

Household, the largest category at $382 million, included uses such as lawn, ornamental and houseplant fertilizers. In 1975, it is estimated that 20.5 out of 51 million homeowners cared enough about their lawns to buy fertilizers. By sheer numbers this category dominates the non-farm use figures. Since 1975, significant gains in both lawns, garden and ornamental uses have taken place, as well as an increase in the number of single-family homes. Annual increases of 15-25 percent were predicted.



The professional turf category represented 33 percent of non-farm fertilizer tonnage valued at $137 million. Significant uses were estimated as follows:

Uses	Tons (millions)	Mfg. Dollars (millions)
12,000 golf courses	290	$ 55
14,000 office parks	114	16
28,000 neighborhood parks	87	12
200,000 churches	60	11
28,000 high schools	56	8
15,000 suburban shopping centers	47	7
46,000 apartment/condominum complexes	46	8
19,000 government buildings & grounds	28	4
A whole host of others	107	16
TOTAL	835	$137

Prestwich and Messerly had interesting remarks about future trends in fertilizer usage on golf courses. They predicted less use of nitrogen on fairways to reduce mowing, use of higher analysis fertilizers with fewer applications and less tonnage, and narrower fairways. Growth for the golf course market was predicted (two percent annually) on the basis of an increase in the number of courses.

Finally, the report estimated that six percent of non-farm fertilizer was used by nurseries and sod farms. No prediction for growth was made.

Prestwich and Messerly perceived the significance of the lawn service contractor market but did not give special estimates for it. They did predict that it then represented four percent of the household market and 30 percent of the professional turf category. Deriving new figures from these percentages, lawn service contractors represented 7.8 percent of the non-farm fertilizer market. Using the $300 per ton figure Prestwich and Messerly did, the lawn market represented approximately $92 million in 1975. The lawn care market has grown significantly since then.

Overall, the authors predicted an annual four percent growth in non-farm uses with an increase in mass, chain merchandizing of fertilizer for the do-it-yourself market. Also, good increases in household ornamental fertilizer use and uses for the commercial building market were predicted.

Outlook

The outlook for ferilizer supply does not look at all dim, in spite of natural gas prices and a greater demand.

Fertilizer consumption for the U.S. and Puerto

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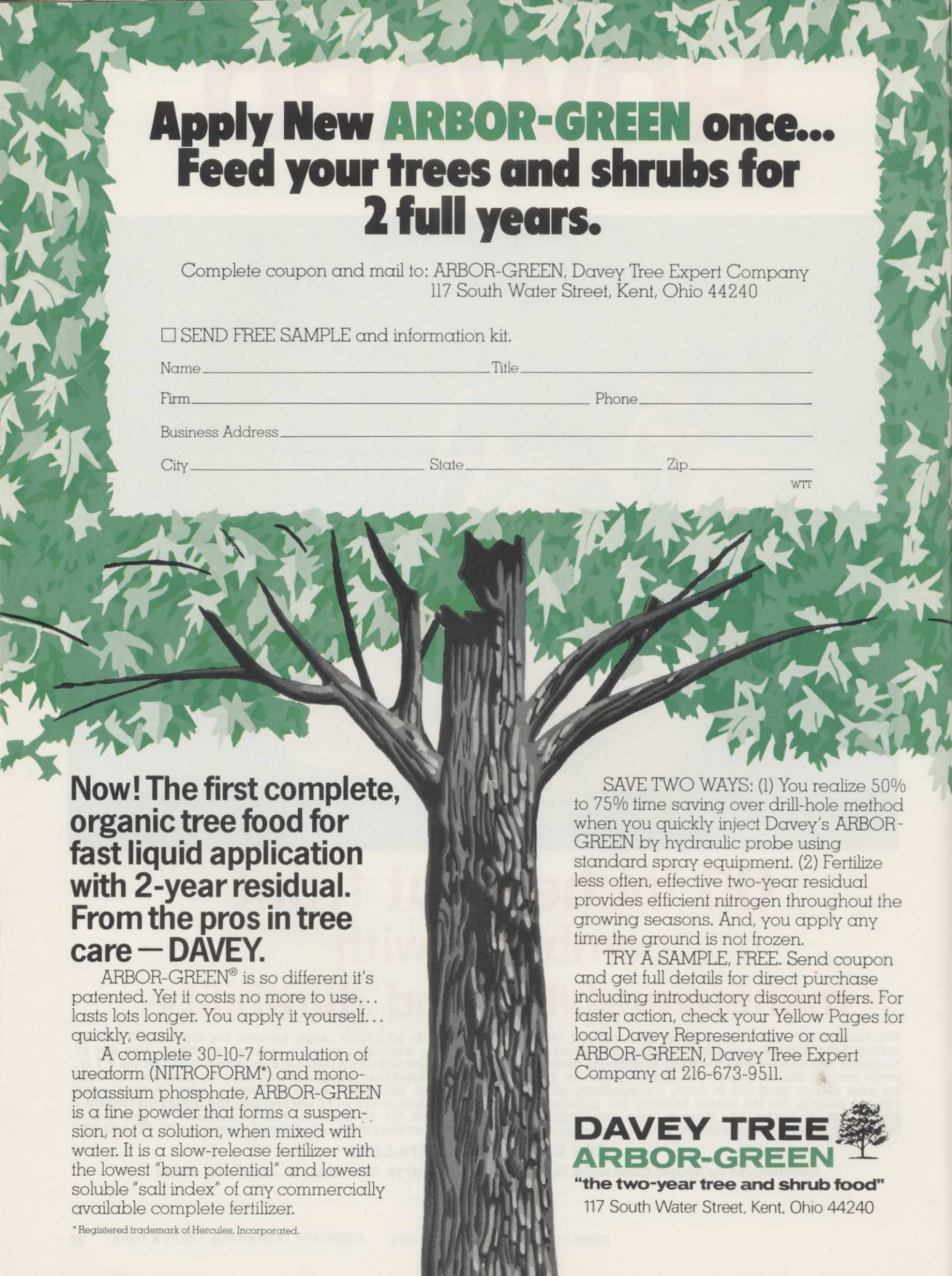

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Rico during the year ending June 30, 1977 was a record 51.6 million tons. This was 5 percent more than the 49.2 million tons used during 1975-76.

Nitrogen continues to be the main concern of most turf managers, primarily because it is the nutrient that is always needed, and in the largest quantities. At the center of the pessimistic outlook for nitrogen supplies is the natural gas situation. There is, however, an optimistic note, if you could call it that. While it may look that we are running out of natural gas, we are only running out of the most easily obtained and largest reserves of natural gas.

Annual use of natural gas in the U.S. amounts to some 20 trillion cubic feet per year. Proven reserves amount to about 216 trillion cubic feet, which would last only until 1988.

That is grim, in itself, but there are indications that an additional 25 years supply is discoverable, IF producers are given adequate incentive to find it. Basically, this means that it might be available, if you're willing to pay for it. Much hinges on government price deregulation and the resulting research and development.

Importation of nitrogen will become more prevalent in the future. Occidental Petroleum Co., and the USSR have negotiated an exchange of urea for superphosphate. Other possible sources of imported nitrogen are eastern European countries and Latin America. Mexico already has three plants under construction with a potential output of 900,000 tons of ammonia per year. Canada will also add to U.S. supplies of nitrogen.

Coal gasification is an alternate source of nitrogen. Estimates place significant nitrogen production from coal eight to ten years away.

Government regulation plays an increasing role in the cost of fertilizer and other chemicals. Standard Oil of California employs 115 people just to review regulations, according to Dave Barlow, vice-president of Chevron Chemical Co. Government intrusion may be symbolized, he added by the *Federal Register*, which now runs at more than 50,000 pages a year, ten times its size a few years ago. Costs represented by regulations arise not only from their numbers, but from their unpredictability.

A final consideration of nitrogen supply is the cost of transportation. It is presently estimated that more than half of the dollars spent on fertilization are for transportation. Anything that increases the price of transportation will also increase the price of fertilizer.

Basics

Turf fertilizers are more than just simple combinations of nitrogen, phosphorus and potassium. Each element has various sources which greatly affect the conditions for its use. If you consider these conditions for all three elements, the decision of which to use becomes more complex.

Soil test is key to proper fertilization

Probably one of the best known methods of determining how much fertilizer is needed, and the method most often ignored or performed incorrectly, is the soil test.

Whether the actual test is performed by a laboratory or you do it yourself with a good soil testing kit, it is vital to prepare a representative sample of soil to be tested. Each aspect of the area to be tested must be separated. Slopes will differ from flatter areas. Sandy areas will differ from an area with more clay.

A standard soil sampler, that removes small cores, should be used. The core depth will vary from 2 to 4 inches, depending on the recommendations of the testing laboratory or kit instructions. Measure the depth from the soil surface and remove any thatch or turf from the sample. Select ten or more cores in a uniform pattern over the area. Take more for large areas. Mix the cores in a large container. Of this mixture, 1 to 2 pints of air-dry soil is usually required by a laboratory. Remember, for a soil test to be representative, the sample must be representative!

A well-established soil testing laboratory will usually have a form for filling in the previous history of the soil under consideration. This is vital in interpreting the results of a soil test. Arsenic, according to Dr. James Beard, "Turfgrass: Science and Culture," will give the same type of reaction as phosphorus in standard testing methods. If the soil has a history of arsenic use, it is necessary to know this in order to properly recommend phosphorus levels.

Depending upon the intensity of management, a soil test should be made at least every four years. It is important that a good turf manager provides the turf with enough nutrients and to do it economically.

Standard soil tests determine phosphorus and potassium, calcium and magnesium. Often, iron is included. Cation exchange capacity and pH are important in determining nutrient availability and correcting any pH problem that might exist. Tests for measuring salinity and sodium content are available if you suspect a problem.

Nitrogen is the most difficult element to establish a criteria for application. Color is the most used denominator. However, it is important that, while maintaining a healthy color to the turf, color is not overemphasized.

On highly-managed turfs, an excess is usually more of a problem than a deficiency. Excessive nitrogen increases disease susceptibility, can stimulate shoot growth to the extent that root growth is decreased, and can stimulate thatch accumulation. Plant hardiness is also affected by nitrogen level. Excess can be worse than deficiency. **WTT**

Fertilizer

Nitrogen is probably the most difficult element to assess for turfgrass needs. Soil tests generally do not give an adequate reading of nitrates and tissue cultures only tell how much nitrogen the plant is using, not how much is there for it to use.

Determining how much nitrogen to apply brings together many aspects of turf management, including soil type, climate, irrigation practices, turfgrass species, and the level of turf use.

Nitrogen fertilizers are classified into three groups: natural organic, synthetic inorganic, and synthetic organic.

Natural organic fertilizers usually have the lowest nitrogen content. They include such materials as sewage sludge, animal by-products and seed meals. The nitrogen in these materials is not readily soluble in water and is dependent to a large degree upon microbial degradation. Bacteria initially convert the nitrogen in these materials to the ammonia form and then through nitrification the ammonia is transformed into nitrate form for uptake by the plant roots.

Because of the low analysis of these materials, it is necessary to apply them in large amounts. They are often more expensive per unit of nitrogen, but provide a good slow release form of nitrogen and generally improve soil.

Natural organic fertilizers are also characterized by reduced leaching potential, 4-8 weeks residual, and minimum burn potential.

Synthetic Inorganic nitrogen fertilizers include ammonium nitrate, which contains 33% nitrogen, ammonium sulfate, which contains 21%, and sodium nitrate, which contains 16%.

This type of fertilizer dissolves readily in water and has a high burn potential. It is important to apply them when the plants are dry so that fertilizer particles do not adhere to the shoots. Grass shoots which have been burned by fertilizer in such a manner generally have a bleached appearance. It is essential that you water them into the soil after application to avoid this.

Ammonium nitrate contains 50% nitrogen in the nitrate form and 50% in the ammonia form. Ammonium nitrate readily dissolves in water where the cations (NH_4+) and nitrate anions (NO_3-) separate. The nitrates are readily available for plant uptake. The ammonia cations undergo nitrification and are transformed into the nitrate form. The rapidity of this reaction leads to the high burn potential.

Ammonium nitrate has a lower rate of gaseous ammonia loss than other water soluble nitrogen carriers. It is slightly acidifying and is a substantial fire and explosion hazard. Because of its strong acidifying properties, ammonium sulfate is pre-

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ferred for use on soils that have a more basic pH. Foliar burn potential is also high.

Sodium nitrate is seldom used. It is considered a fire hazard and has a high affinity for water that makes handling and storage difficult.

It is seldom desirable to apply more than one pound of actual nitrogen per 1,000 square feet when using a synthetic inorganic fertilizer. Because a fast growing turfgrass species requires 150-200 pounds of nitrogen per acre per growing season on unirrigated soil and as much as 225-300 lbs of nitrogen on irrigated soils, it is often necessary to make applications every ten days during the favorable growing season.

Synthetic organic nitrogen carriers can be subdivided into water-soluble and water-insoluble forms.

Urea, made by reacting ammonia and carbon dioxide under high pressure and temperature, is the primary water-soluble form. After application, approximately 60% of the urea will be transformed into the ammonium form in one day. This provides a rapid initial plant response, but gives a short residual period with the remaining urea undergoing transformation in 7-10 days. Volatilization, or loss of gaseous ammonia from the soil into the atmosphere, is somewhat of a problem with urea. It also has a tendency to leach and a high burn potential. Application recommendations are similar to the synthetic inorganic. Urea contains 42-46% nitrogen.

There are four basic categories of water insoluble fertilizers. They are ureaformaldehyde (UF), isobutylidene diurea (IBDU), sulfur coated urea (SCU), and the plastic coated fertilizers.

Ureaformaldehyde contains about 38% nitrogen, 70% of which is in a water-insoluble form. The nitrogen in UF is released by microbial degradation. The same factors (temperature, moisture, oxygen and pH) that provide optimum turf growth also provide optimum conditions for the bacteria. As a result, fertilizer release is greatest when turf growth and need is grestest. This offers an advantage, for example, during periods of summer drought stress. Excessive nitrogen could be detrimental as cool season turfgrasses go into a dormant stage and could affect turf recovery. Bacterial action would slow down at this time and, with a UF fertilizer, excessive nitrogen release would not be a factor.

The nitrogen in UF is broken down into three classes, based on water solubility: cold water insoluble nitrogen (CWIN), cold water soluble nitrogen (CWSN), and hot water insoluble nitrogen, (HWIN).

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Fertilizer

The CWIN portion is the portion that becomes slowly available over a number of weeks. HWIN is that part which becomes available over an extended period of time, usually a year or more. CWSN is available for immediate uptake.

It is generally advisable to have about 25% of the nitrogen in UF as CWSN.

Isobutylidene diurea contains 38% nitrogen, 90% of which is in a water-insoluble form. Nitrogen release from IBDU is controlled by the size of the particles and soil moisture content. The smaller the particle size, and the higher the temperature, the faster the release. The pH plays a slight role. Release will be more rapid at lower pH's. Temera-ture also affects release rate, but lower temperatures do not give an effect such as that with UF materials.

Turf response to IBDU is minimal during the first one to four weeks after application, but is excellent after that period. It has been shown that IBDU applied in the fall, because of its limited dependence on temperature, will provide an excellent greenup in the spring.

Sulphur coated urea is a relatively new product, researched and developed by the Tennessee Valley Authority. It will provide an excellent slow release form of nitrogen but its main benefit, it would seem, would be on soils deficient of sulfur.

The rate of N release from SCU is dependent upon the thickness of the sulfur coating (whether or not a coating of wax sealant is applied), moisture and temperature. The nitrogen is released through degradation of the coating and pores in the coating. Increases in moisture and temperature increase degradation of the coating, thereby raising N release.

Research at numerous universities has shown SCU to be an excellent turf fertilizer. The rate of N release in SCU is expressed as a 7-day dissolution rate. The higher the rate, the more WSN is available for immediate uptake. Commercially available SCU has a 7-day dissolution rate of about 30% and as a result gives rapid initial response.

Some mechanical damage can occur to SCU, altering its rate of dissolution. However, research by TVA has shown that the usual spinner type field applicators will not cause serious damage to the coatings if excessive disk speeds are not used and the backplate is cushioned. If these precautions are followed, disk speeds of up to 700 rpm are acceptable. High speeds, such as those used for spreading lime, must be avoided.

Plastic coatings are often applied to soluble sources of nitrogen, phosphorus, or potassium to slow the rate of release. The rate of release in this case is governed by the thickness of the plastic coating and temperature. Moisture has little influence, unless it's availability is limited. Mechanical damage from shipping, application and even mowing after application can seriously affect the slow-release properties of the plastic coated materials.

Because of the various conditions across the country, it is difficult to recommend nitrogen rates. General recommendations are made, but may be raised or lowered depending upon turf variety and the level of management desired.

The faster growing species of turfgrass, bentgrass, Kentucky bluegrass and bermudagrass, generally require 150-200 pounds of nitrogen per acre during a growing season on unirrigated soil. If there is irrigation, the needs are raised to 225-300 pounds per season. The slower growing varieties, fescues, and zoysia, generally require only half as much.

There is also variation among cultivars of species. Kenblue Kentucky bluegrass, for example, needs .4-.7 pounds of nitrogen per 1000 square feet per month while Merion needs one to one and one-third pound per month.

Phosphorus and potassium requirements are much easier to supplement because soil tests for these elements are usually quite accurate. Recommendations in general include 2-3 pounds per 1000 per year if levels are high and 6-7 pounds per 1000 per year until the deficiency is corrected if the levels are low.

The most common potassium fertilizers are potassium chloride, potassium sulfate and potassium nitrate.

Potassium chloride is commonly known as muriate of potash. It has a high chlorine content and salt index, but is widely used because of its relatively low cost.

Potassium sulfate is more expensive than potassium chloride but has a lower salt index and may contain no more than 2.5% chlorine.

Potassium nitrate has about 13% nitrogen. It has a high water solubility and provides a basic soil reaction. It can cause deflocculation, or separation of the soil elements, if used on a continuous basis. It is generally inferior to potassium sulfate and chloride.

Phosphate carriers are not as frequently used as nitrogen, but there are conditions when it may be beneficial. Often, soils on which turf is being established for the first time might require supplemental phosphorus.

Superphosphate is a treated natural phosphate carrier and is the most important source of readily available phosphorus for turf.

Triple superphosphate contains little calcium sulfate in comparison to superphosphate. It is widely used in compounding high analysis fertilizers.

The phosphorus in rock phosphate is relatively insoluble. In order to be of use it must be finely ground and used only on soils with a high level of decaying organic matter under acidic conditions.

Calcium metaphosphate can be an effective phosphorus source in an acidic soil. It has a relatively low cost.

Basic slag is an example of a by-product phosphate. It has a long residual activity, decreases soil acidity and also contains some manganese and magnesium. The degree of phosphorus availability depends upon the fineness of the material.

Ammoniated superphosphate is an example of a chemical phosphate. It is often used in high analysis fertilizers. It has an acidifying effect. **WTT**

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COMPARISON OF PREEMERGENT HERBICIDES FOR CRABGRASS

By Ralph E. Engel and C.W. Bussey; Cook College, Rutgers University

Editors Note: This paper is a combination of a report given at the Rutgers Turfgrass Expo in 1976 and new data from 1977 research by Engel and Bussey. Table three is new data, as well as information regarding oxidiazon (Ronstar) which has come on the market since the 1976 research.

Ralph E. Engel, Ph.D., is research professor of turfgrass science for the Department of Soils and Crops, Cook College, Rutgers University, New Brunswick, NJ. C. W. Bussey is head soils and plant technician at the College.

Table 1. Crabgrass control obtained in Kentucky bluegrass with experimental and standard preemerge herbicides. 1976.

Herbicide	Rate, ai/A	Date of Application*	Crabgrass Control (%)
bensulide 3.6 g	7½	April	98
"	10	April	99
bensulide 4 ec	10	April	93
A820 2 g	6	April	92
A820 2 g	8	April	95
A820 4 ec	6	April	11
E1 131 50W	2 + 2	April-May	56
Sonalan 3E	1½	April	10
Treflan 5 g.	1½	April	84
Bay 6867 3E	4	April	7
Bay 6867	4	June	17
Hercules 26905	6	May	89**
Siduron 4.57 g	18	May	51
Siduron + DCPA 5 g	5 + 6	May	62
Siduron + DCPA 5 g	12 + 10	May	73

*April 28, May 21 and June 7.
**Very severe turf injury.

A search for better preemerge herbicides and better methods of using the currently available herbicides was conducted in 1976 and 1977 on a Kentucky bluegrass type turf at New Brunswick, New Jersey. Benefin, bensulide, DCPA, siduron and oxadiazon were among the market types studied with regard to most efficient procedures of use and as standards in comparison with six experimental types.

Methods — A mature type of mixed Kentucky bluegrass was growing on the test area. Crabgrass was overseeded on the test site in late March. An activated sewage sludge was used as a carrier for the seed at a rate of 1 lb N/M ft^2.

Herbicide treatments were made in April, May and June. Individual plots were 3' x 20' and each treatment was replicated three times in a randomized block design. Granular applications were made with a 3 ft. drop spreader. Spray applications were made with a fan type nozzle that delivered 40 gallons of solution/A with CO_2 pressure. The late spring and summer season had sparse rainfall and irrigation was used during this season to encourage crabgrass. Crabgrass germination appeared to be dispersed through this period. Crabgrass control ratings were made in September by three individuals and averaged.

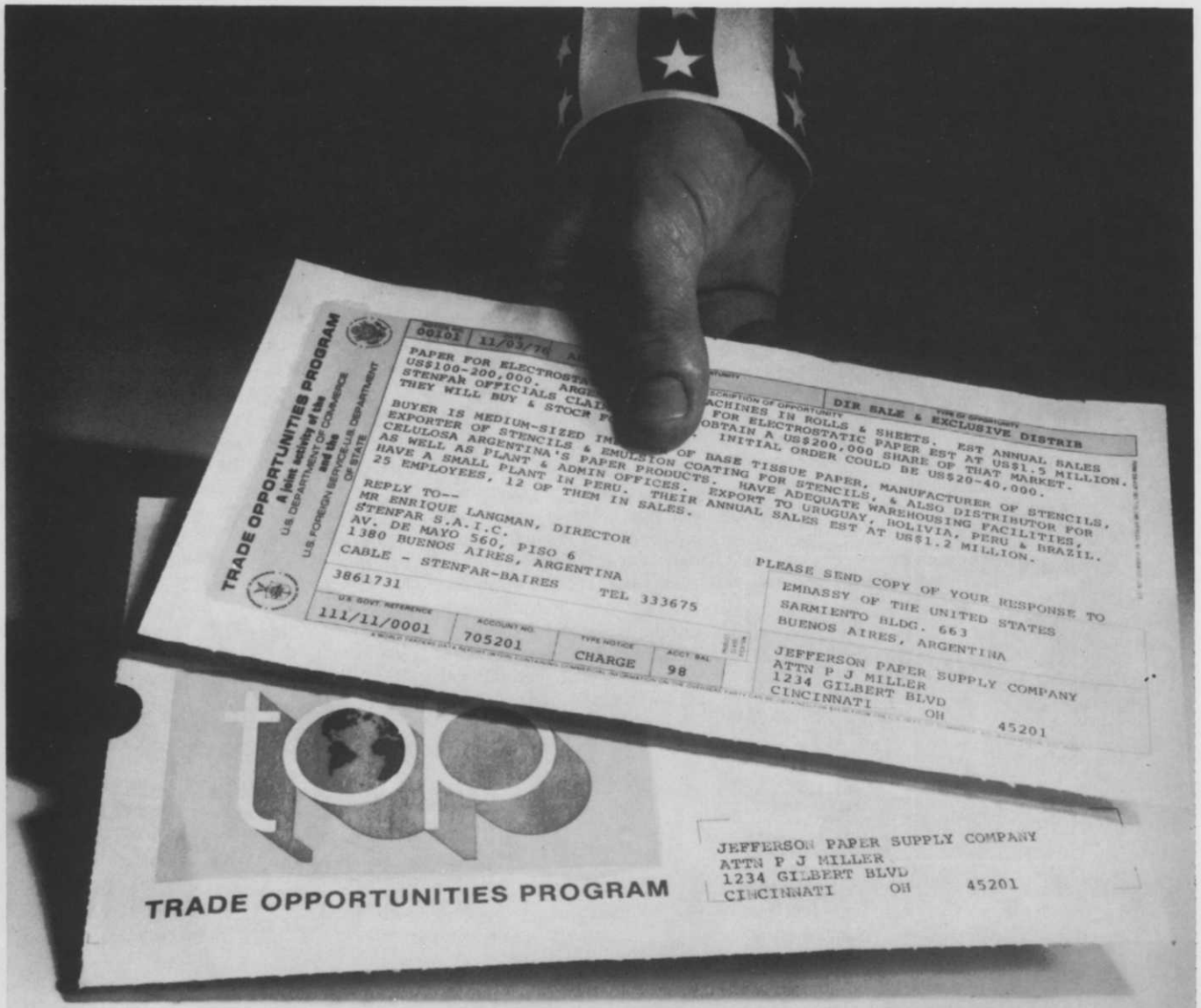
Results — Bensulide gave control of 98, 99 and 93% with 7½ lbs gr, 10 lbs gr, and 10 lbs ec/A, respectively (Table 2). Benefin at 2 lbs/A gave 44 and 92% control, respectively, with April and May application. DCPA gr at 10 lbs/A gave 35 and 62%, respectively, with April and May application. Siduron at 18 lbs/A in May gave 51% control. Of the experimental preemerge herbicides, A820 [butralin (4-(1, 1-dimethylethyl)-N-(1-methylpropyl)2-6-dinitro-benzeneamine)] and RP 17623 [oxadiazon (2-tert-butyl-4-(2,4-dichloro-5-isopropoxyphenyl)-^{2}-1,3,4-oxadiazolin-5-one] were the only types that gave crabgrass control equivalent to bensulide, the best performing standard. El 131 (prosulfalin), a spray preparation, that is approaching marketing, gave 53% control with May application. The remaining experimentals did not show promise as used.

Oxadiazon has given a very good performance for crabgrass control. We found that effectiveness decreased if the application was delayed 2 or 3 weeks from late April into May. Also, the oxadiazon was severe on bentgrass in other tests, but this could be a plus on bentgrass-infested Kentucky bluegrass turf. This chemical is labeled for Kentucky bluegrass and bermudagrass only.

The application date of preemerge herbicides affected control in all comparisons (Table 2). In the case of DCPA, May application was better than April application which is the reverse of an earlier

Continued on page 38

For ad on preceding page circle 113 on free information card



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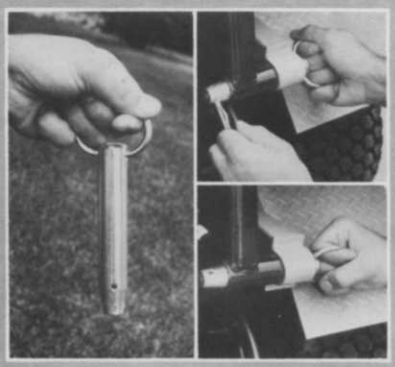

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Just attach the Quick Aerator to the Turf-Truckster with three pull pins. The hydraulic system and dump kit on the Turf-Truckster allow you to lift and lower the Quick Aerator on the go from your seat. So movement from green to green is simple and fast.

Three types of tines are available: slicing, coring (two sizes) and open spoon.

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*Rating for vehicle equipped with 9.50-8 rear tires.

3 QUICK SPIKER. Attach the Cushman Quick Spiker to a Turf-Truckster equipped with PTO, hydraulic system and dump kit with just three pull pins. Spike a 57-inch swath, even over undulating greens, with the two precise spiking gangs. Nothing to tow. Nothing to load or unload. Spike 18 greens in less than 2½ hours.

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5 SPRAYER. The PTO package with extension shaft makes the 18-hp Turf-Truckster ready to spray greens the easy accurate way.

The Turf-Truckster transmission and built-in variable speed governor assure a uniform ground speed, even over varying terrain. And an accurate metered spray means proper application and less chemical waste.

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6 TOP DRESSER. The chassis-mounted top dresser, driven by the PTO of the Turf-Truckster, eliminates the need for self-powered units and time-consuming walking.

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7 SPREADER/SEEDER. The Cushman Cyclone Spreader/Seeder can be rear mounted on either the 3- or 4-wheel 18-hp Cushman Turf-Truckster, and it's controlled by the Cushman PTO extension shaft. Depending on the material, this spreader can broadcast over an area up to 40 feet wide.

In addition, the Cyclone Spreader/Seeder mounts on either the short box or flatbed/box and the driver controls all operation from his seat.

8 GREENSAVER (DRUM AERATOR). The Cushman Greensaver™ is the efficient low-cost way to aerate greens and tees. Attach the Greensaver to your Turf-Truckster (equipped with a hydraulic system and dump kit) with 3 quick-release pull pins.

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Herbicides from page 34

test (1 and 2). With benefin and EL 131, May application was more effective than April application. RP 17623 was more effective with April than May application.

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2. Engel, R. E. and C. W. Bussey (1974). Factors in the performance of preemerge herbicides for crabgrass control. Rutgers Turfgrass Proceedings, Soils and Crops 5:47-54.

Table 2. The effect of application date of preemerge herbicides on crabgrass control in Kentucky bluegrass turf. 1976.

Herbicide	Rate, ai/A	Date of Application	Crabgrass Control (%)
DCPA 5 g	10	April 28	35
DCPA 5 g	10	May	62
Benefin 2½ g	2	April 28	44
"	2	May	92
"	2 + 2	April-May	87
E1 131 wp	2	April	15
"	2	May	53
"	4	April	9
"	4	May	24
RP 17623 gr	3	April	93
"	3	May	76

Table 3. Long-term Results with Several Preemerge Herbicides. 1968-1977.

Herbicide	Rate, lb.a.i./A	Period of Years	Long-term Crabgrass Control Av. (%)
oxadiazon	3*	1968-1977	89.7
bensulide	10	"	80.8
DCPA	12	"	72.6
oxadiazon	3*	1968-1970	89.4
		1972-1977	
benefin	**	1968-1970	66.0
		1972-1977	

*A 4 lb/A rate was used in 1968 and 3 lbs in all others.
**1½ lbs in 1968 and 1974, 2½ lbs in 1973, 3 lbs in 1972 and 2 lbs for all others.

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Suspension System: Heavy duty torsion bars, leaf springs, front and rear shock absorbers, designed to support the bigger payload.
Dump Construction: Dual wall, double thick for heavier loads, longer life. Undercoating for even greater resistance to corrosion.
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DIRECT MAIL ADVERTISING BOOST TO SPRING BUSINESS

Public awareness of turf, tree, and landscaping services has never been greater. This spring is a good time to tap this increasing customer consciousness with a well-aimed direct mail promotion.

Many do-it-yourselfers notice the effects of professional care on neighborhood landscapes. They hear the favorable words of satisfied customers. At the same time they see the price of do-it-yourself products rise to the point that professional care can provide better results for nearly the same price. These observers are close to making a decision and an effective mailer can make their decision simpler and more attractive.

Direct mail offers many advantages over other forms of advertising. The advertiser controls who receives the advertising. He can select specific areas to receive the mailer to increase route efficiency. Direct mail contact with desired customers reduces the need for other types of advertising, such as display advertising in the Yellow Pages. It puts the brochures, which every company should have regardless of advertising strategy, to work. It is less offensive than telephone or door-to-door campaigns for both the advertiser and the customer. Finally, direct mail pieces with return coupons provide the advertiser with written proof of customer commitment. (It should be noted that use of the mails to defraud is a Federal offense and care should be taken not to mislead the customer concerning your service.)

The point is you control the advertising and therefore business resulting from it, not the other way around.

Planning Promotion Area

The subdivision provides today's businessmen with a display area. When so many homes look alike, homeowners must rely on either house paint or attractive landscaping to make their homes stand out. Builders rarely offer more than four models in any one subdivision. The desire to express individuality is thus limited and must be directed into other areas.

In older neighborhoods, inflation has brought renewed respect for the value of property. Neatness and pride in property have increased on both the individual and neighborhood level.

In either case, homeowners notice the work of professional firms in their neighborhood. When an attractively marked truck is seen repeatedly in any one area the word spreads rapidly that the so-and-sos use professionals and their property is noticeably better in appearance.

The result is the people in the neighborhood are presold on the idea of professional care. It is up to you to make sure they get that service from you and not someone else. Direct mail is a way to do just that.

This neighborhood unity is a good reason to plan your promotion accordingly. Not only does it reduce distances between jobs, it permits you to regularly check your work on other homes in the area. Soil chemistry, moisture conditions, fungus and insect problems, and regulations are relatively the same allowing your staff to concentrate on specific conditions.

Extension personnel can give you precise information if you ask them about a specific area. The resulting specialization or expertise can be used as a selling point over other firms. Familiarity is one of the strongest reasons for a homeowner to choose your company over others and also one reason for them to accept a higher bill.

In new subdivisions it is a good idea to talk with the developer, the realtors selling in the area, and local agricultural extension personnel. If these people are aware of your special interest and expertise in the area they may pass your name on to buyers. Of course, developers may prefer to enter into an agreement on a large-scale basis. Nevertheless, it can only help you to be well-known with the primary contacts of buyers.

After determining realistic staff and equipment limitations, map out specific neighborhoods you'd like to reach. Don't go after more than you can handle with quality service. The neighborhood unity works both ways. Mistakes were just as, if not more, noticeable as good results.

Who Will Do the Work

You now have to make a decision. Do you have the staff and the time to address, mail, and follow-up on the mailings?

If not, mailing service companies can do a variety of jobs for you. They can help design the piece, get it printed, supply the addresses and the labels, and supervise distribution either by mail or private delivery service.

To get a better perspective, consider the do-it-yourself approach. You need to design the mailer. You must get it printed. There are addresses to obtain, labels to make or purchase, and arrangements to make for distribution. Winter slow periods can be utilized to do much of this work. Remember, you'll want to make at least two separate mailings to the same people. Actually, if you don't mind the extra work and the size of the program is relatively small, building your own direct mail program can be a challenge.

Addresses and Names

Once you have mapped out the streets for your program, you need the name and exact address of each resident. Some areas are fortunate to have telephone directories, which list people by street and number. If these are not available in your area, the Recorder of Deeds at the city hall is your next source, unless you don't mind paying for a list that someone else has already obtained this way. The recorder has plat books which you may look at and copy from. You must first locate the plat number and then cross-index for names.

If you have a rather large program, more than a few hundred, the names and addresses are available from mailing list companies. These lists may have more addresses than you need. To purchase such a list can be expensive. To rent one is much cheaper.

Renting a list generally means that you never see the list. You provide the company with your pre-printed mailing piece and they put on the labels and mail. But, each time you mail you must rent the list.

If your program is relatively small, Xerox labels can be made from the list of names obtained from directories or the city. These labels are reproduced on a standard copier and have peel and stick backs. You keep a master list for your records and for updating.

Advertising Design

To design a mailed advertisement you must understand the habits and characteristics of the average homeowner. Chances are the first person to see your piece is the housewife. It must catch her eye or else end up in the garbage can. Women spend roughly 80 percent of the domestic dollars in the U.S.

At the same time you must not forget the man who is more than likely the resident expert on maintaining his yard. The mailing must not contradict his basic beliefs of home maintenance. It can however, utilize his sense of responsibility to his family as a means of making an impression.

The mailing must make its point and get a response with the least amount of trouble to the homeowner. Opening an envelope can be considered trouble to some people. An attractive, folded card with a perforated return card can be very effective.

When you have an idea of the basic design, it may be worthwhile to have an artist do the final design. Select someone with direct mail design experience if possible. The printer may be able to recommend an artist.

If you include a return card make it very simple. A simple check-off for an estimate and a place for name and address are adequate. It should be post-paid if possible.

The outer part of the card should not be cluttered. It should have an attractive illustration (per-

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Circle 124 on free information card

haps a home landscape), a catch phrase to get the reader to open the card, and the company name. On the inside of the card should be a very concise message about your company and its services along with the offer you are making. Keep it simple and attractive. This is where an artist can help greatly.

The postage on your mailer is determined by its dimensions and weight. On large mailings an oversized card can be expensive. Before making major commitments to printing and lists, check with your post office for bulk mailing information.

Printing

One reason to have an artist help is to figure the best combination of printing variables. Typefaces, paper stock, photographs, color illustrations, folding, and stapling are all things that you will need to decide. There is a knack to choosing the right combination of variables to obtain the most pleasing product.

The more you print, the cheaper the unit cost is. The same basic mailing piece can be used many times and for a number of years. Consider these points when determining the size of the press run.

When you have your design completed, get estimates from a number of printers. Unless your quantity is extremely large, stick to small, local printers. Some printers will quote high prices to discourage certain types of jobs.

To give some idea of the printing process, let's consider the folded card mentioned earlier. This is for a small mailing to 500 homes in one city. You will make two mailings, the first in March and the second in mid-April. You are trying to keep costs down and still have an attractive and effective piece.

One printer quoted a slightly higher price than others but he also exhibited artistic talent when making recommendations for the design.

Together you and the printer select the typefaces and sizes for the copy. The printer sets the type for you to proofread and reduces the illustration to fit your design. The type and illustration are then pasted into position and printing plates are made.

To keep costs down and still have a colorful, attention-getting mailer, you have selected a light green card stock. The printer uses black ink to print more than 1,000 copies and saves the plates in case you will want to print the same piece again.

If you have a postal permit (very desirable for return postage), the permit number should be in-

Continues on page 48

TRELAN®
"Whole Tree Chippers"
From brush to full 18 inch trees....
A chipper to fit your needs.

MODEL C-14 (14" Capacity)

MODEL D-60 (18" Capacity)
THE CHIPPER MAKERS
STRONG MANUFACTURING COMPANY
498 Eight Mile Road
REMUS, MICHIGAN 49340
Phone 517-561-4881
or 517-561-2280

ARBOTECT® 20-S
The strongest Dutch elm disease protection you can give a tree.

ARBOTECT 20-S fungicide helps make it possible to save many elm trees that otherwise would be lost.

Injected into the trunk of the tree, ARBOTECT builds a barrier against Dutch elm disease inside the tree itself. It helps prevent the disease in healthy elms, and can often save infected trees if they are treated early enough.

Used along with sanitation, insect control, and root graft elimination, ARBOTECT can significantly improve the effectiveness of a Dutch elm disease control program.

ARBOTECT differs from other elm fungicides in several important ways:

- It is registered at rates high enough to be effective.
- It is concentrated, requiring much less water for injection, so trees can be treated much faster.
- Thiabendazole, the unique active ingredient in ARBOTECT, is highly effective against *Ceratocystis ulmi,* the fungus that causes Dutch elm disease.
- Even though it is more effective and convenient, ARBOTECT costs about the same to use as other elm fungicides.

This year, put ARBOTECT to work in your disease control program. It's the strongest protection you can give an elm against Dutch elm disease.

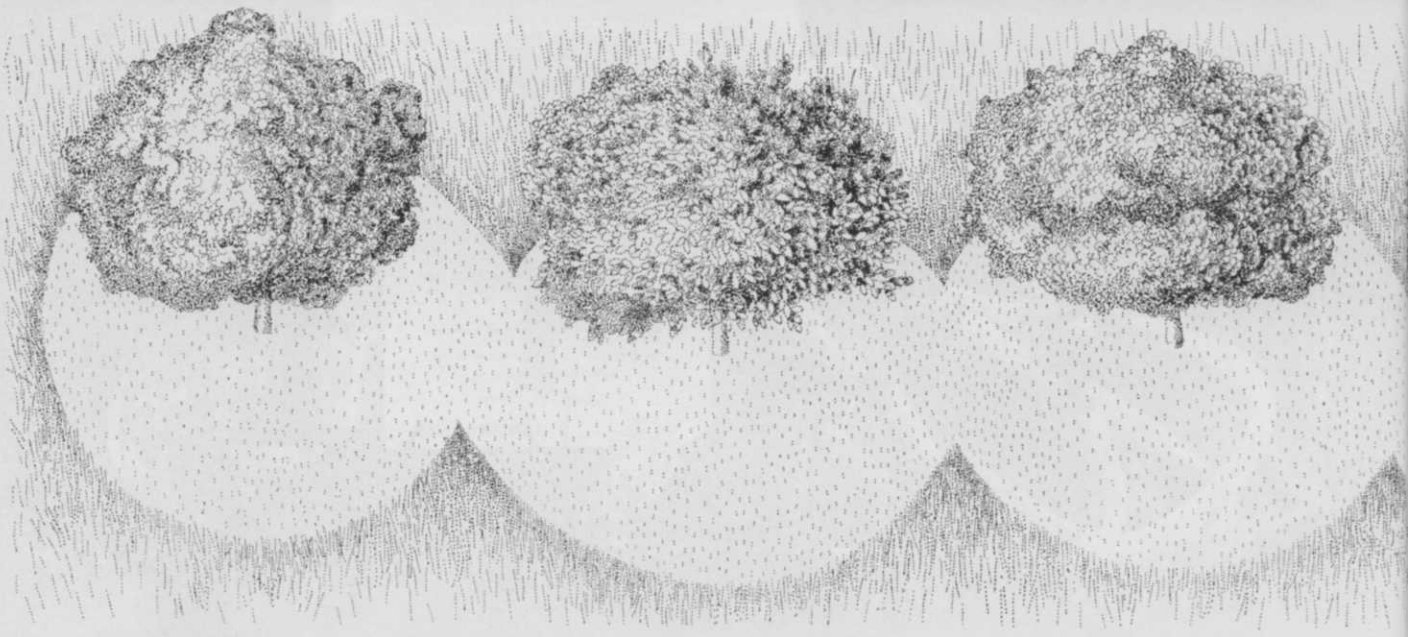
Arbotect
Strong protection for elms.

MERCK

Agricultural Products
Merck & Co., Inc. P.O. Box 2000
Rahway, New Jersey 07065
ARBOTECT (thiabendazole) is a registered trademark of Merck & Co., Inc.

Circle 143 on free information card

THE NEW GRAV
IT'LL RUN CIRCLES ARO



With its optional 72" mower and 50" wing, the new Gravely GMT 9000 cuts a 9', 11" swath, allowing an operator to mow as many as 33 acres in a standard eight-hour day.

But even better than that, the GMT 9000's tight turning radius and the 50" wing enable it to execute a 360° turn, leaving no uncut grass in the circle. As a result, an operator can mow down one side, turn right around and head back the other way without missing a blade of grass in between.

The GMT 9000 can cut within one inch of obstacles. So you save on trimming equipment.

Yet as big and sizeable as the GMT 9000 is, it's also maneuverable enough to cut within an inch of obstacles like fences, shrubs and trees. So you eliminate the need for a lot of costly extra trimming equipment.

Perhaps best of all, besides being able to mow a lot of grass, the new GMT 9000 is designed to keep doing it for a lot of years.

THE STORY OF OUR LIFE.

You see, beneath that impressive rugged exterior, lies an even more impressive interior. Designed to give each and every GMT 9000 a long, lively life.

The exclusive Gravely 8-speed transmission is a good example.

The result of years of testing, it delivers the precise speeds and power you need to do a lot of jobs a lot easier. And a lot better.

You get steady power at low ground speeds to handle the muscle jobs. You also get a choice of seven other speeds for mowing, hauling and rapid transit.

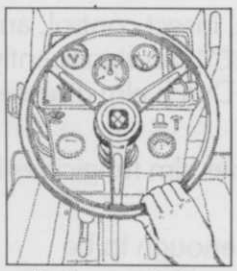
What's more, its precision-cut gears run in an oil bath, for less friction and longer life.

MORE POWER TO YOU.

The engine itself is another excellent example. A water-cooled 4-cycle, 4-cylinder brute, it delivers 26 HP at 3200 RPM. The engine has an oil filter and is pressure lubricated. The crankshaft is spheroid cast iron, counterweighted, running in three replaceable precision bearings.

The cylinder head is aluminum alloy for lighter weight and better heat dissipation.

The wet-type cylinder liners also help to dissipate heat.

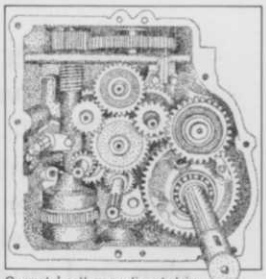


Full-time power steering makes a full day of mowing easy, and practically everything's right before your eyes on the full instrument panel.

The result is an engine that is built to last. And last. And last.

HANDLE WITH EASE.

Yet for all the GMT 9000's brute strength, it handles like a pussycat. The instant forward and reverse, by moving one lever, increases maneuverability, reduces operator fatigue. And you have full-time power steering.



Gravely's all-gear direct drive. A transmission with a lot of teeth in it.

Individual wheel brakes improve steering control. In proper locked position they provide a parking brake for the tractor.

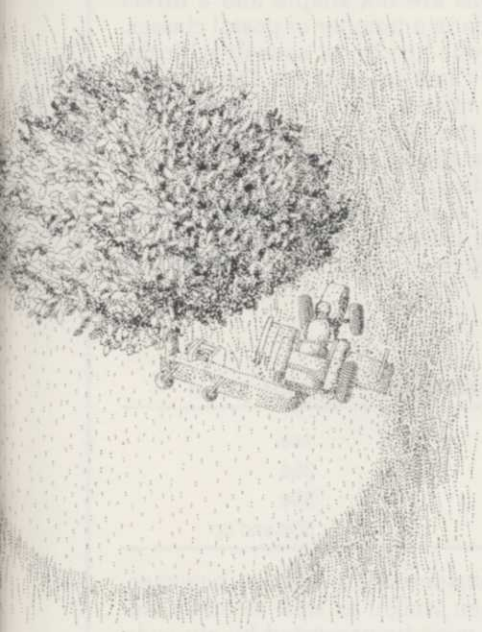
The high-back seat is foam-padded, hydraulically-suspended and fully adjustable for individualized operator comfort.

The full instrument panel shows the operator everything from the water temperature, to hours of operation, at a glance.

THINGS ARE TOUGH ALL OVER.

As you've already seen, every possible part of a Gravely is built extra tough to stand up to year after year of day-in, day-out grounds maintenance. The transmission housing is cast iron.

ELY GMT 9000.
ND THE COMPETITION.



The pivoting front axle is welded steel construction and comes with rugged king-pin bushings. Precision bearings are used at major wear points.

ALL-GEAR DIRECT DRIVE.

The Gravely all-gear direct drive from engine through the transmission and to the PTOs vastly improves power transmission.

And because it's all-gear, it completely eliminates the bothersome belts in the power train which have always been prone to break, slip or wear out.

WITH ALL YOU CAN ATTACH TO A GMT 9000, YOU'RE GOING TO BECOME VERY ATTACHED TO IT.

You've already seen how the 72" mower and 50" wing attachments make the GMT 9000 unsurpassed in mowing efficiency.

What's more, its optional live and independent rear PTO and category 1, 3-point hitch enable it to utilize a number of other attachments as well.

How to keep your tractor from going into hibernation for the winter.

Attachments like plows, cultivators, carts, sweeper and snowblower. As well as equipment like a seeder, sprayer, snow blade, aerator and enclosed cab.

As a result, the GMT 9000 can handle just about every grounds maintenance job imaginable.

In addition to building tractors to last, Gravely wants its attachments to last, too. That's why most Gravely attachments are engineered to be completely compatible.

IT CUTS COSTS NICELY, TOO.

Thanks to its greater performance, durability and versatility over most single purpose mowers, a GMT 9000 should result in a lower total cost ownership in the long run.

And, as you know, Gravelys do run a long, long time. Which brings us to yet another important point.

With as well as a Gravely performs, you won't want to replace it.

With as well as a Gravely is built, you probably won't have to.

If you've got a lot of grounds to maintain, let us show you a lot of grounds maintenance tractor.

Name _____ Title _____

Company _____

Address _____

City _____ State _____ Zip _____

GRAVELY

Clarke-Gravely Corporation. A Studebaker-Worthington Company.

FOR THE GRAVELY DEALER NEAREST YOU, OR FOR MORE INFORMATION, CALL TOLL-FREE 1-800-528-6050 EXT. 280. OR FILL OUT THE ABOVE COUPON AND SEND IT TO: GRAVELY, 0224 GRAVELY LANE, CLEMMONS, NORTH CAROLINA 27012.

Direct Mail *from page 44*

cluded in the design of the mailer and printed with the rest of the mailer.

The final steps are folding, stapling, and attaching labels. All these jobs can be done mechanically and are monotonous tasks when done by hand for large mailings.

Except for small companies with few and infrequent billings, lawn, tree, landscape, or sod companies regularly make large mailings and therefore deal with postal officials frequently. Check with them prior to mailing your advertisement to see how they prefer to receive large bulk mailings. They may ask you to presort the mailer by zip code.

Summary

Direct mail advertising requires more effort and involvement than newspaper or other print advertising. However, by utilizing existing staff and equipment effectively and hiring out some of the specialty work, you can cut this extra work down to a minimum.

The areas you will probably want to contract for are getting the names, addresses and labels and artistic design of the piece. If you have a good printer he can help guide you through the whole process.

Direct mail advertising services, on the other hand, can do the entire job for you. You simply tell them what you want and they will do it. However, they may be unable to provide you with the exact area you want. You may have to accept, and pay for, a certain amount of waste advertising.

Perhaps the cheapest form of direct mail advertising is the private delivery service that puts together packets for home delivery. It can do the entire job as well, but the product tends to be buried in a batch of other companies' advertising. If you want your brochure to stand out and you want your company to have a unique, quality image, the private delivery service may not be desirable.

The first run of your mailer will be the most expensive. After you have the basic design, and perhaps the list, costs can drop by nearly 40 percent. A rough cost estimate of the double mailing to 500 homes, including artist and list rental fees, is $600.

Once the returns start coming in, be sure to follow them up quickly. If properly done, the direct mail program will reap accounts in your standard route area. Don't be disappointed by a low return on the first mailing. It is often the second mailing that does the trick.

When you have reached a saturation point in certain neighborhoods, the direct mail program lets you grow in a controlled manner by going after specific new areas.

Control of your advertising is as important as controlling other aspects of your business. To keep your prices competitive you must guard your company from wasteful types of advertising. For the local service company, newspaper, radio, television, or large Yellow Page advertising may not be the best advertising buy. **WTT**

Postal Information

Postal regulations are not simple and a direct mail program can be in a number of postal classes. Before you print your brochure, consult with the Permits and Third Class Information Department at your local post office. You'll be amazed how much information the individuals in this department know and can throw at you like a time and temperature recording.

Basically, third class is for circulars, books, catalogs, and other printed matter. There are no size restrictions on third class matter. Rates are based on weight.

Third Class Rates

Weight (oz.) Not Exceeding	Rate (per piece)
2	14¢
4	28¢
6	39¢
8 and up	50¢ and up

Bulk mail is considered third class, however, rates are based upon weight as well as other factors. All bulk mail must be presorted by zip code and you must have a minimum of 200 pieces. Consult the post office for bulk mail rates.

First class is the other important class for mail advertising. Post card mailings fall into this category and reply cards do also. Until November 1978 the minimum size for a post card is 3 x 4½ in. After then it will be 3½ x 5 in.

First class, presorted mail is given a 1¢ per piece discount. To do this you must have a minimum of 500 pieces.

For reply post cards you need to obtain a permit number from the post office. The charge for this is $30 per year. For each card returned you pay the first class rate plus a 12¢ per piece handling charge.

First Class Rates

Kind of Mail	Rate
All 1st class mail weighing less than 13 ounces, except post cards	13¢ for the first ounce plus 11¢ for each additional ounce.
Over 13 ounces	Special priority rates.
Single post cards	9¢ each
Double post cards (reply portion does not have to bear postage when originally mailed.	9¢ each half

For the post card mailing mentioned in this article, postage would be roughly $90 for 500 pieces, $30 for the permit, and 12¢ for each reply card returned.

We finally found a way to improve Balan...

Granules shown actual size

...we made it easier to apply!

Balan's new granular size lets you apply it like fertilizer, and makes it easier than ever to effectively control some of your tough weed grasses.

Balan gets the tough ones,

such as, crabgrass, foxtail, goosegrass and Poa annua.

After ten years of proven success on thousands of acres of turf, Balan has become the nation's number-one granular preemergence herbicide. Its unmatched effectiveness and economy make Balan a "must" in every turf program.

Goosegrass
(crowsfoot, silver crabgrass and hard crabgrass)*

Poa annua
(annual bluegrass)

To get maximum effectiveness from your Balan turf program, contact the Elanco field representative in your area:

Northwest—M. D. Carlson
313 Almond Court, San Ramon, CA 94583

Southwest—R. C. Wortham
510 Pembrook Drive, Pasadena, CA 91107

South—S. C. Dolinak
3035 Directors Row, Suite 408, Memphis, TN 38131

Northeast—A. G. Ekeson
5 Campbell Road, Fairfield, NJ 07006

Southeast—M. E. Nealon
2776 Jo Beth Drive, Lawrenceville, GA 30245

Midwest—S. H. Springer
P. O. Box 50279, Indianapolis, IN 46250

Midwest — R. G. Baade
R.R. 6, Box 332A, Martinsville, IN 46151

East—R. E. Simmons
409 Hudson Ave., Staunton, VA 24401

ELANCO
Balan®

Circle 106 on free information card

Or write Dept. E 455 Elanco Products Company • A Division of Eli Lilly and Company • Indianapolis, Indiana 46206 U.S.A.

GOOSEGRASS

SILVER CRABGRASS

CROWSFOOT

**@!!*#@!!

What you call it can't make it go away ...but Balan® can.

Depending on where you are, Goosegrass gets called a lot of things. But no matter where you are, nobody calls Goosegrass an early riser. It doesn't get up and get growing with regular crabgrass in early spring. Goosegrass waits to make its appearance until six to eight weeks after crabgrass germinates. And by the time you see it, there's not much you can do about it. But an application of Balan just before it begins to germinate is all it takes to put an end to your Goosegrass problems. Ask your Elanco distributor salesman to help you work out a full-course Balan program.

Elanco Products Company
a division of Eli Lilly
and Company
Department E-455
Indianapolis, Indiana 46206

Circle 105 on free information card

ELANCO

Balan®

Balan's new granular form makes it even easier to apply.

GUIDE TO WEED CONTROL FOR MANAGERS OF TURF

By William H. Daniel, Ph.D., Department of Agronomy, Purdue University, W. Lafayette, Ind.

A careful analysis of the basic cultural operations should be the beginning of a contemporary approach to weed control. Turfgrasses* are often grown in situations which offer limited opportunity for their survival. Infestations by weeds can be expected as turfgrass density is reduced. Practices such as high mowing and good nutrition that aid in producing, strong turfgrass and reducing injury to or weakness in the turf will reduce potential weed encroachment.

Four herbicide use patterns for weed control in turfgrass are:

—Application of a selective preemergence herbicide such as siduron to maintain bare ground around individual plants.

—Application of a nonselective herbicide such as cacocylic acid, dalapon, amitrole, paraquat, glyphosphate, chloropicrin, metham or methyl bromide to vegetation for total kill to facilitate renovation (last resort).

—Application of a selective preemergent herbicide such as bensulide, benefin of DCPA to kill germinating weed seedlings.

—Application of a selective postemergence herbicide such as 2,4-D, silvex, dicamba and bentazon to kill weeds already present in the turfgrass.

In three of the four use patterns, the importance of selectivity is obvious.

Dicot Weed Control

Systemics applied to plants (postemergent) are absorbed and translocated to give selective kill of target species. Often two or more chemicals are combined to provide control of numerous weeds. The 2,4-D, 2,4-5T and MCPA are phenoxyacetic acid derivatives. These combine synergistically (supportive action) with MCPP and 2,4,5-TP, the phenyoxyproponic acid forms, to eradicate a wider range of species. Such a combination permits a lighter application than when individual chemicals are used. When dicamba, a benzoic acid-pneollacetic acid derivative, is added, a broad spectrum weed control formulation results.

A rule of thumb: initially use the lightest herbicide rate recommended. Weeds in cool season grasses may be treated any time that the weeds are growing. Since weeds germinate in the spring, summer and early fall, selective kill in September and October will assure a clean lawn for the coming spring and summer. A fall weed control program permits the desired grasses to develop maximum turfgrass cover in a favorable growth period.

The lease effective time for weed control is late spring as this opens the turfgrass to crabgrass and other weeds and thus encourages the cycle of weed production.

For best results apply hormone weed killers when the temperature is above 50° F and soil moisture is adequate for plant growth. Avoid windy or hot days. Apply herbicides when wind speed is low so as to minimize drifting of herbicide mist and vapors to nearby ornamentals.

Applications of herbicides one day prior to mowing is recommended. Ample leaf surface favors increased plant absorption. Most compounds require two to four weeks for evidence of a complete kill. Delay spraying of new lawns until the grass has grown enough to require two mowings, more than thirty days, to allow grass seedlings to become established.

Liquid and wettable powder herbicides should be diluted with enough water (1 to 3 gallons for each 1000 sq. ft.) sufficient to moisten the foliage. Apply at low pressure (20 lbs/sq. in.) in a double coverage (overlap) treatment. Avoid excess pressure which creates fine droplets or mist.

Weed and feed programs using herbicides on granules of fertilizers, vermiculite, or calcined clays, provide formulations for spreader use. Generally more chemical is needed in the dry granular form. These depend upon dew or leaf dampness to dissolve and distribute the weed chemical.

Check label and follow the correct procedure to obtain the desired result. Avoid excessive chemical use.

Chemically filled cans and aerosol cans offer a convenient form, particularly for individual plant treatment. Avoid excessive application when spot treating.

Preemergence Control for Annual Weeds

One of the giant steps for turfgrass management has been the development of preemergence weed control. Preemergence material is designed to eliminate selectively competition from unwanted seedlings. The preemergent chemical affects germinating weed seeds and allows the desired grass to flourish.

To be effective the chemical must be present in toxic concentrations at the soil surface during the time susceptible seedlings are germinating.

Warm soil and adequate moisture favor germi-

Dr. Daniel is in the final stages of writing his new "Handbook for Turf Managers." The book has 39 chapters on topics such as Management, Grasses, Rootzones, Pest Control, and Turf Uses. The new book will be available from Harvest Publishing Co. this spring.

nation of annual grasses. In the spring a soil under a turfgrass cover is cooler than bare ground. The warm rainy period in mid-spring aids in crabgrass germination which may continue until Labor Day. When the mean temperature reaches 55° F (13° C) for a two-week period crabgrass will germinate.

A good, dense turfgrass cover can shade and prevent new seedlings from starting. Mowing high and maintaining a dense cover, plus allowing the soil surface to dry between irrigations discourages crabgrass seedlings.

Earlier, Bandane, Azak, Chlordane and Zytron and arsenates were used routinely as crabgrass preventers, but currently they are not recommended.

Siduron does not affect perennial grass seedlings, so overseeding can be done concurrently with the chemical application. Where spring seeding is needed the use of siduron allows the selective start of desired grasses.

Approximately fifteen weedy grasses including foxtails, sandburrs, goosegrass, barnyard grass, witchgrass, lovegrass, and most summer annual grasses as well as the hairy and smooth crabgrass may be inhibited by the application of preemergence herbicides.

"An ounce of prevention is worth a pound of cure" was never more true than in the use of preemergence herbicides. Preventing the competition of weeds has become a well accepted turf care procedure.

Postemergence

Two applications (5-7 days apart) of organic arsonates can selectively kill crabgrass, sandbur, goosegrass, witch and barnyard grass, foxtails, chickweed, yellow sedge, Johnsongrass and dallisgrass, and other weeds. However, it will not kill seeds of *Poa annua*, lovegrass and nimblewill, among others.

Formulations including monosodium, disodium, amine and calcium acid methane arsonates, applied when the soil moisture is adequate to favor growth, will kill eht plants by arsenic accumulation. Allow for a second treatment. Severe browning indicates excess use. Yellowing by the third day following the first application is the expected result.

Phenylmercuric acetate is used on lawns as a selective killer and fungicide. Granular formulations spread over a damp turfgrass surface are often used in lieu of sprayer applications. It may be practical to combine crabgrass killers (AMA) and weed killers (2,4-D) in one treatment. Centipede and St. Augustine grasses are not tolerant to organic arsenicals.

Vertical thinning in mid-fall (mechanically

YOU CAN EXPAND INTO THE LAWN SPRAY BUSINESS DO IT THE RIGHT WAY:

LEARN all you can — AGRO CHEM'S TRAINING COURSE COVERS:

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KEEP ALL OF YOUR PROFITS — . . . NO FRANCHISE FEES . . . NO ROYALTIES . . . NO EXTRA COSTS

EARN — Agro Chem's methods produce the highest possible profits.

- **HIGH** ..... Professionalism based on superior results achieved through a totally correct scientific lawn care system based on soil tests of **YOUR** local areas, with materials formulated to your conditions.
- **HIGHER** ..... Authority based on your ability to recognize, cure, & control problems acquired from Agro Chem's training program.
- **HIGHEST** ..... Performance based upon your applications of prescription formulated materials that produces superior results.
- **SOARING PROFITS** ..... with repeat orders. Non competitive products, equipment & services that outperform competitors products. Reduced costs of maintenance with more beauty for your customer.

FIND OUT HOW YOU CAN BECOME AN AGRO CHEM DISTRIBUTOR

Call or write for a Seminar in your area

Make your reservation immediately as space is limited

Financing available to qualified applicants.

FOR MORE INFORMATION — CALL MR. GREGORY COLLECT . . . (312) 455-6900 *OR WRITE*

AGRO·CHEM, INC. "CONTROLLED GROWTH THROUGH CHEMISTRY"

11150 Addison Franklin Park, Ill. 60131

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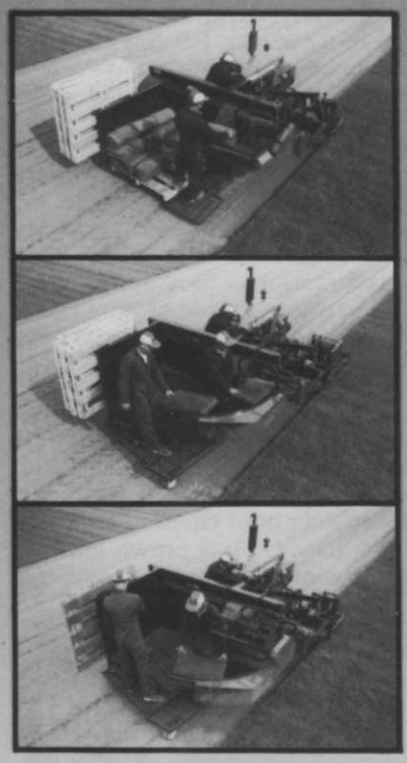
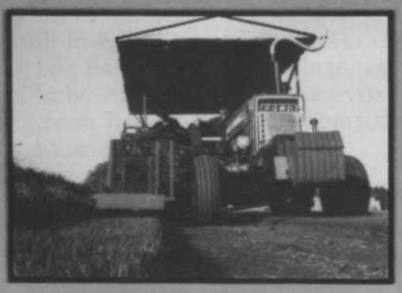
WHY

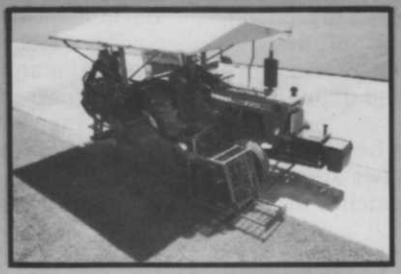
Over 700 Harvester Users Prefer the BROUWER Sod Harvester



- Rolls, Slabs, or Folds.
- Choice of pallet sizes from 36″ to 60″ wide.



- No waste, cuts to fences, ditches, irrigation pipes.



- Standard tractor and parts: Maneuverable, simple, easy to operate and maintain.
- Now the new model A3A offers even more production, economy and dependability.

- Operates off uncut turf, preventing tracking and turf damage.
- Performs efficiently in wet, dry, soft, hard, rough, and weak turf conditions.
- Harvests up to 1500 square yards per hour in widths of 15″, 16″, 18″, & 24″.

ACT NOW AND GUARANTEE:

Best possible price, best trade in allowance, prompt delivery, value for your dollar.

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TURF EQUIPMENT LTD.

The Ultimate in Reliability, Versatility and Economy

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powered thinners) may release desired species by cutting and reducing the fast growing crabgrass.

In areas of St. Augustinegrass, the postemergent product Asulam (Asulox®) has given selective control of crabgrass, bullgrass, bahiagrass, goosegrass and sandburr. With repeated treatments smutgrass, torpedograss, and crowsfootgrass were controlled. The standard rate of application for Asulam is 2 lbs. active ingredient per acre, or 2.2 kg per ha. When used on bermudagrass Asulam required less applications for an effective kill than MSMA required, but it can injure bermudagrass.

Control of Creeping Weedy Grasses

Plants that provide obvious variation in color or texture should be eliminated from a turfgrass lawn.

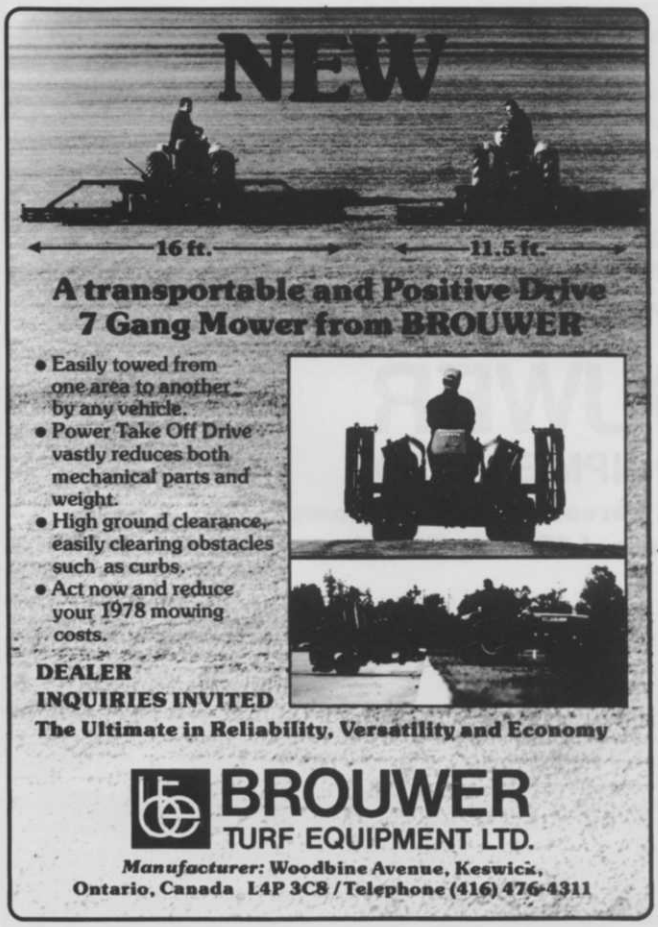
Creeping bentgrass is useful on golf greens but appears patchy in areas of bluegrass. The fine leaves, long stems, and the thick mat of disease and drouth-susceptible bentgrass can change from beautiful to ugly within one spell of adverse weather. The fine, soft, horizontal stems have many dormant buds which renew and expand, imparting a patchy look.

Often a few bentgrass seeds may be included in bluegrass seed. The seed labeling laws allow for a small percent of 'other crop'. The patches of bentgrass begin to show within two years. Bentgrass grows well in low wet areas and in shade and can be an excellent lawn turf when well managed.

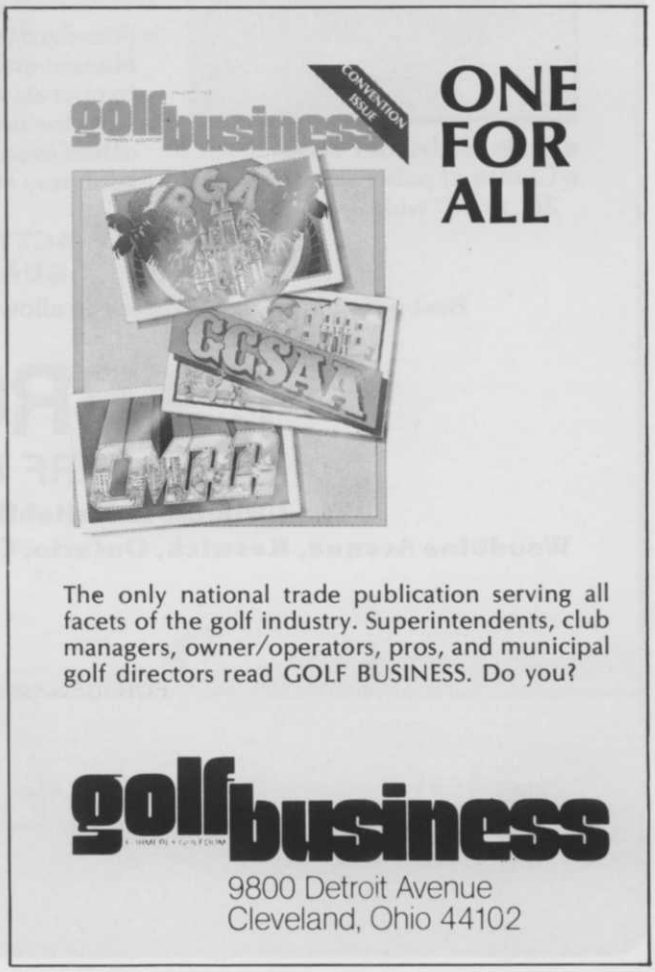
Nimblewill is characterized by clumps of dark blue-green leaves during the summer. With the first frost the leaves turn brown and die back to the nodes. Nimblewill stems are harder and firmer than those of bentgrass. Regrowth starts at the nodes of the stems in the spring. Patches gradually spread and predominate over bluegrass in the midwest. Nimblewill can be useful in shaded areas. Seed produced in the fall is scattered by birds.

Bermudagrass patches occasionally occur in lawns, especially in southern areas. Hairy, stubby leaves, long hard stems, fast summer growth, and aggressive spread typify bermudagrass. Following fcost, the white, dead leaf is obvious. White, hard, coarse, underground rootstalks provide for survival overwinter, and are the source of new shoots for next season's growth. Bermudagrass is very drouth tolerant and high temperature tolerant. Bermudagrass is hard to kill.

Zoysiagrass was so well advertised a few years ago that many people planted a few 'plugs'. Within three years dense patches developed. The stiff, spreading stems and strong upright leaves tend to dominate. Zoysia spreads until checked by a barrier or dense shade. Because it is brown during a dormant period overwinter it may be considered



Circle 140 on free information card



SHEA STADIUM, HOME OF THE NEW YORK METS, CHOSE ADELPHI . . . AND THEY'RE GLAD OF IT!

They could have chosen any one of a number of new grasses. Because of the results they'd seen at other locations, they chose "ADELPHI" Kentucky Bluegrass.

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undesirable. It is drouth and sun tolerant, susceptible to few diseases or pests and recommended for use in sunny turf areas in the southern portion of the midwest and midsouth.

Quackgrass has thick, tender, white underground stems which favor an aggressive spread and minimize the chance for control. It is most prevalent in farm and new urban areas. It quickly spreads from the balls of soil around shrubs and from flower beds or new topsoil. A ring of brownish fibers at the nodes of the white rhizomes helps to identify quackgrass. The leaves are dark green and wide. The seedhead is a central stem with closely packed large seed (similar to ryegrass). Quackgrass is a nuisance in a well-managed bluegrass lawn.

There are alternatives in dealing with these creeping weedy grasses if one chooses not to tolerate them. To reduce bentgrass, the area should be harshly thinned in the spring and fall. Groom and manicure in an effort to keep the desired grass healthy. Hand rake, thin with vertical power thinners and aerify or cultivate — anything to keep the bentgrass open and immature. Rake from the edges to the center of the patches to reduce them.

Annual Weedy Grass Preventors

Active Ingredient per acre	per 1000 sq. ft.	Generic Name	Manufacturer & Trade Name
pounds			
2	0.05	BENEFIN	Elanco, Balan
12	0.3	BENSULIDE	Stauffer, Betasan
12	0.3	DCPA	Diamond-Shamrock, Dacthal
12	0.3	SIDURON	DuPont, Tupersan
4	0.1	OXADIAZON	Rhodia, Ronstar

Persistence of Various Herbicides in Soil

Herbicide	ai	Residual Phytotoxicity
	lbs./acre	months
glyphosate	1-3	0-2 days
paraquat	1-3	0-2 weeks
2,4-D	1-5	1 month
Dalapon	6-20	1 month
Endothall	6	1 month
Amitrole	3-18	1-3 "
2,4,5-T	1-2	3-6
Silvex	1-2	4-7
Arrazine	2-4	4-7
Monuron	2-4	5-6
Diuron	3,6-4	5-7
Picloram	0.5-1	6-12
TCA	12.5-67	7-12
Fenac	4-5	12
Simazine	2-4	12
2,3,6-TBA	15-20	12-32

Nimblewill may be eliminated by under cutting and removing one-half inch sod, after which the area should be reseeded. A practical alternative (for the fall period) is to spread bluegrass seed and then rake the surface vigorously. Loosening and thinning the soil will reduce the stems of niblewill. Rake again in early spring.

A dilute spray of glyphosate (½ ounce/1,000 sq. ft.) is most effective on mature grass leaves. Spray when th eplant needs to be mowed so as to obtain maximum benefit from plant adsorption. The area should not be mowed for 24 hours following spray application. After the glyphosate has translocated, which requires one to three days, seed can be spread. The germination of the seed will be enhanced if the area is verticut and then raked heavily to remove thatch. Hand hosing to wash seed into soil can be helpful. Maintain a moist area by daily watering to aid in seed germination.

Patches of bentgrass may be eliminated from bluegrass with Ebdothal (1 lb./A) and Silvex (2 lb./A) in hot summertime. Caution is important to avoid using these chemicals in areas having tree and shrub roots. Glyphosate can be safely and effectively used to eliminate bluegrass or all growing grasses.

Removal ofsod will eliminate thatch and weeds and allow the area to be started with improved varieties of turfgrass. Bentgrass and niblewill are comparatively easy to remove since they produce primarily surface stems. Bermuda and zoysia grasses have hard, deep, coarse underground stems. Where there is one sprig of either of these grasses, it will reinfest. To rid an area of these grasses all pieces must be removed, especially along the edges of walks, around trees and shrubs.

Poa Annua

Annual bluegrass, *Poa annua*, is so named because it produces seeds during the year of germination, while most other poa's produce seed only in the second year of their growth. The individual *Poa annua* plant is constantly rejuvenating itself by forming new tillers, crowns, roots and seedheads. It is unlike corn or oats which mature and die. Instead *Poa annua* continues to produce new growth and live until wear, disease, drouth or stress kills the plant. Meanwhile, the multitudes of seed already produced are lodged at the soil surface, and with favorable moisture and cool temperature, seedlings begin to develop. More than 60 seedlings per square inch (6/cm^2) have been observed in a fairway. (Ohio in August).

Some individual *Poa annua* plants have been observed to have lived for three years. While the old plants persist, new seedlings infest. This process continues for ten months of a year and provides a combination that is difficult to eliminate or prevent.

Poa annua grows in every county of every state in the U.S. and throughout much of the world. The fairways of the oldest golf course in Sweden have more than 90% *Poa annua* cover. Due to rapid infestation the age of some European sportsfield turfgrass areas can be judged by the extent of *Poa annua* infestation. In Holland experimental blue-

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grasses which are most infested with *Poa annua* are discarded as 'least competitive' after one year's test.

The most prevalent weed on golf courses in the United States is *Poa annua* whether it be in bentgrass greens, bermudagrass alone, or overseeded areas in winter. In cool moist climates *Poa annua* as well as many other turfgrasses can provide excellent turfgrass cover.

Poa annua, 'friend or foe,' long has been debated by turf managers. Its acceptance as a 'creditable' turf species is subject to future review. The authors feel that until *Poa annua* is controlled turf renovation and seeding to the newer improved cultivars of turfgrass will be seriously handicapped.

Some products useful for crabgrass prevention have been known to kill *Poa annua* as it germinates. Crabgrass germinates primarily during April through June. In contrast, *Poa annua* germinates from the first of August to the first of July in cool locales and October through May in warm winter areas.

Some turf managers have used as many as three applications of preemergence herbicides a year and still may have 30-40% *Poa annua*. Granular Linuron for selective *Poa annua* control in bluegrass is labeled and available to sod growers in some areas. Growth regulating chemicals slow the growth of *Poa annua* but have a similar effect on other turfgrasses. Growth regulators have also been used to inhibit seed formation and thus subsequent seed development for future infestation. Currently experimental rates of glyphosate is being used for *Poa annua* control.

Research on *Poa annua* continues because of the evident need. Meanwhile, the lack of control will restrict the sale and utilization of some of the new improved Kentucky bluegrass and bentgrass varieties. The more vigorous competitive improved perennial ryegrasses will be used as a 'preferred to *Poa annua*' turfgrass cover.

In areas where *Poa annua* is being used for turfgrass it should be kept open and growing aggressively so that its renewal process can provide adequate young plant parts. **WTT**

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Watson recommends drought measures

With or without drought conditions, there never will be enough water anywhere in the world to allow continuing excessive waste to be tolerated, according to Dr. James R. Watson, agronomist and vice president of The Toro Company, in his keynote address at the Texas Turfgrass Conference in December.

Drought not only means a lack of rainfall, he said, but a shortage of water. In addition to lack or rainfall, water shortages exist because of an increasing demand and excessive, growing waste.

Two kinds of strategy are needed to combat drought, he emphasized: one for personal and business use of water; and another to apply on a much broader scale — the "green industry".

Dr. Watson offered several suggestions for using less water to maintain large turf areas.

Highest watering priority should go to the most intensively managed area. The greens on a golf course are an example. They are generally the most valuable part of the course and an area where play is most critical.

Should irrigation practices should be followed. The best combination of little wind, low temperature and high humidity is the best time to irrigate. That time occurs most often just before dawn. When watering trees and shrubs, use probes so the water will penetrate deeply, he suggests.

Reduce other causes of stress, being especially alert to salt buildup.

Make sure fertilization programs are adequate, especially phosphorus to encourage root growth. Maintain a constant and uniform supply of nitrogen at a low to medium level to avoid unnecessary leaf growth. Slow release materials should be considered. If soluble sources are used, apply the materials frequently at low rates rather than vice versa. Infrequent high rates encourage excessive leaf growth.

Raising mowing height, even as little as 1/32 of an inch on a green, can have a significant effect on the ability of the turf to tolerate moisture stress. Mow less frequently.

Wind barriers can help, especially where there are large expanses of open spaces.

Aggressively seek additional sources of water. Among the possibilities is treated sewage effluent. There are about 75 golf courses, known to Dr. Watson, in the U.S. that are using treated wastewater for irrigation. There are more than 30 in California, at least six in both Arizona and Colorado, and one or more in Texas, Florida, Idaho, Illinois, Missouri, New Mexico, Nevada, New Jersey and probably several other states.

There are approximately 2,000 facilities in the U.S. today that provide land disposal of wastewater in volumes ranging from a few thousand to several million gallons per day. The amount of waste water available for irrigation is going to expand dramatically, Dr. Watson predicts, mainly as a result of EPA action.

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VEGETATION MANAGEMENT

By Roger Funk, Ph.D., Davey Horticultural Institute, Kent, Ohio

TREE

Q: *In planting trees in urban areas, what effect does soil incompatibility have on root development, overall vigor, and winter hardiness? The tree ball is one texture, soil backfill is another, and native soil is a third.*

A: Water and dissolved nutrients do not properly penetrate the interface developed between two distinctly different soil types. You did not mention the soil textures involved in your situation, but, in general, water penetration from a coarse soil to a fine-textured soil is so slow that if the layers are horizontally stratified, an artificial water table can develop above the fine-textured soil resulting in a water-logged condition.

Water penetration from a fine soil to a coarse soil is less restricted, but water will usually accumulate to nearly saturate the fine-textured soil before it moves across the interface.

The movement of water is necessary for the distribution of nutrients and for gaseous exchange, including the availability of oxygen for root respiration and the elimination of carbon dioxide. Any factor that affects the ratio of water and air in the soil and the availability and distribution of nutrients will have an influence on tree growth and vigor. And, of course, root development and tree vigor affects winter hardiness.

Q: *Numerous heavy snows this winter have taken their toll on trees and shrubs in my area. I am considering providing potential customers with some general repair information in my spring promotion. How would you summarize winter damage?*

A: Perhaps the single most destructive weather force on trees and shrubs is physical stress from glaze ice and heavy, wet snow.

Proper pruning, bolting, cabling and bracing are all important in preventing tree damage or repairing damage that has occurred. Multiple-stemmed evergreens such as boxwood, junipers and yews tend to spread apart and break under a heavy snow or ice load. Tying the branches together with a strong cord will help prevent or minimize structural damage.

Corrective pruning should begin when a tree is planted. Pruning not only improves appearance but also helps maintain a strong, sturdy tree. Proper pruning includes: the elimination of narrow, weak crotches and poorly located branches; the prevention of multiple leaders; the removal of crossing and rubbing branches and the removal of dead and diseased branches.

Storm-damaged trees should be repaired as soon as possible after injury occurs. Remove broken and hanging branches that are a safety hazard and may cause additional damage to the tree. Prune ragged stubs and branch ends flush to a main branch, and "trace" any wounds in a vertical, eliptical form. Although the protective benefits of a wound dressing are controversial, they have been shown to reduce the spread of oak wilt, and, also, to aesthetically camouflage the pruning cuts.

Cabling and bracing are essential in the repair of storm-damaged trees. However, their greatest benefits are in prevention rather than correction of damage. Cabling and bracing are particularly applicable in the care of split crotches, V-shaped crotches, inherent weaknesses of species (i.e., maples, hackberry, Siberian elm), or extra heavy fruit and decay. Trees in close proximity to buildings should be given special attention. Inspect cables at least every three years and remove any slack. Also, repair or replace any rusty sections. In trees that have been previously damaged, remove excess suckers and modify the remaining ones so that they will eventually replace the damaged limbs.

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In each case, pitfalls abound. Because *unit price alone* can be misleading.

In herbicides, the gallon price is only one factor in value. Performance is equally important. Together, they can answer the three questions that really count:

1. *What is the smallest cost per acre for maintaining weed-free turf?*
2. *Will the smallest cost buy control that's ecologically sound and trouble-free?*
3. *Which herbicide best provides these ideals?*

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Trimec has broad-spectrum capability. Normally, one light application controls almost all weeds, even hard-to-kill species. In fact, we're surprised when we find a broadleaf weed that's Trimec-resistant. Why? Because Trimec's patented formulation of 2,4-D, MCPP and Dicamba is curiously, synergistically powerful. *The interaction of the three components produces strength much greater than the sum of the separate components.* This synergistic gain multiplies the efficiency, and does it with a small chemical dosage. This synergism also increases Trimec's cool-weather efficiency; it continues to work in late fall, at 50° or cooler.

Test Trimec efficiency

Comparisons have shown that Trimec costs less per acre for weed-free turf than any other herbicide. You use fewer gallons, you seldom need retreatment ... *your total cost is lower.* Such efficiency alone is reason enough to justify a Trimec test. Yet, other benefits are just as persuasive:

Test Trimec gentleness

This herbicide is ecologically sound, and troublefree. Although it's strong enough to destroy almost all weeds, it poses little threat to trees, flowers and ornamentals because there is little root absorption from the light chemical dosage. Tender grasses are protected, too. And the danger of "drift" is reduced. Biodegradeable, precisely factory-formulated, Trimec also eliminates "field chemistry" and the chance of costly mixing errors.

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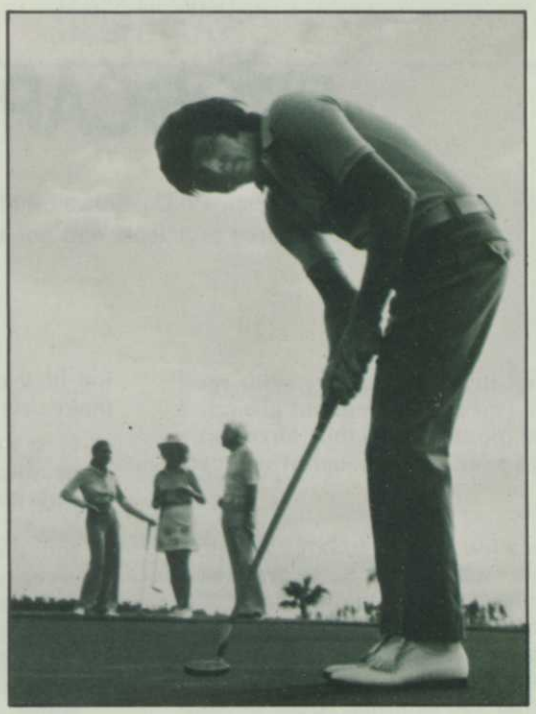

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• Cory Orchard Supply Co.
Nappanee • Desco Chemical, Inc.

IOWA
Cedar Rapids
• Hawkeye Seed Co. Inc.
Council Bluffs • Leisure-Aid
Davenport • Tri-State Toro Co.
Des Moines
• Toro Service Center
W. Des Moines
• Big Bear Turf
• Resthaven Turf Service
Elkader • Meyer Equipment Co.
Iowa City • Little Wheels, Ltd.
Sioux City
• W. R. Anderson Dist. Co.
Waterloo • Foster's, Inc.
Waukee • Baer Ag Supply
West Burlington
• Brayton Chemical, Inc.

KANSAS
Kansas City
• Pest Control Supplies
• Rhodes Chemical Co.
Salina • The Landsco Corporation
Wichita
• Bartels & Shore Chemical Co.
• Champion Turf Equipment, Inc.
• Robert S. Wise Company

KENTUCKY
Florence
• George W. Hill & Co., Inc.
Louisville
• Bunton Seed Co., Inc.
• Ky-Inna Turf Supply Co., Inc.

LOUISIANA
Baton Rouge
• Wyche's Golf Course Specialties, Inc.
New Orleans
• Southern Specialty Sales Co., Inc.
Plain Dealing
• Wyche Golf Course Specialties, Inc.

MARYLAND
Baltimore
• Cornell Chemical & Equip. Co., Inc.
• Miller Chemical & Fertilizer
Landover • Vaughan Seed Company

MASSACHUSETTS
Newton Center
• Grounds Equipment Co., Inc.
Waltham
• Farm Bureau Coop Assn., Inc.
West Newton • The Clapper Company

MICHIGAN
Birmingham
• W. F. Miller Company
Detroit
• Terminal Sales Corporation
Grand Rapids
• Mollema & Son, Inc.
• Parmender & Andre
Hartford • Desco Chemical, Inc.
Kalamazoo • J. J. Dill Company
Royal Oak • Lawn Equipment
Saginaw • Burdick Seed Company
Taylor • Turf Supplies, Inc.
Traverse City • Fergusons Company

MINNESOTA
Minneapolis • Minnesota Toro, Inc.
St. Paul
• R. L. Gould & Company
• Turf Supply Company
Savage
• The Castle Chemical Co., Inc.

MISSOURI
Chesterfield
• Beckman Turf & Irrigation
Grandview
• The Landsco Corp.
• Robison's Lawn & Golf Supply
Kansas City
• Bartels & Shore Chemical Co.
• Champion Turf Equip., Inc.
• Standard Seed Company
Maryland Heights
• Outdoor Equipment Co.
St. Louis
• Crown Chemicals • Kitten & Bear
Springfield
• Champion Turf Equip., Inc.

MONTANA
Billings • Turf Aid Dist. Company
Helena • Mr. Turf

NEBRASKA
McCook • Cornbelt Chemical
Morrill
• Jirdon Agri Chemicals, Inc.
Omaha
• Big Bear Equip., Inc.
• Midwest Toro • The Yard Company
• Leisure-Aid
• Tri-Valley Corporation

NEVADA
Las Vegas
• Clark County Whol. Merc. Co.
North Las Vegas
• Las Vegas Fertilizer Co., Inc.

NEW HAMPSHIRE
Greenland • Turf Specialty, Inc.

NEW JERSEY
Boundbrook
• Loft Seed Company
• Vaughan-Jacklin Corporation
Freehold • Green Hills Turf Supply
Maplewood • Pierson's Mill Company
Mountainside • Andrew Wilson, Inc.
Rahway • Fertl-Soil Company
Saddle Brook • The Terre Company
West Caldwell
• Rockland Chemical Co.
Yardville • Jep Sales, Inc.

NEW MEXICO
Albuquerque
• Albuquerque Chemical Co., Inc.
Roswell
• Roswell Seed Company, Inc.

NEW YORK
Farmingdale • Wagner Seed Company
Hamburg • Eaton Equipment Company
Hawthorne • Metro Milorganite
Hauppauge • Maxwell Turf, Inc.
Jamaica • J & L Adikes, Inc.
Bergen • Lawn Medic
Rexford • S. V. Moffett, Inc.
South Hampton
• James H. Lynch, Inc.
Lincolndale
• Westchester Turf Supply Co.
Syracuse • Agway, Inc.
W. Henrietta • S. V. Moffett, Inc.

NORTH CAROLINA
Charlotte • Seedmen, Inc.
Shelby • Porter Brothers, Inc.
Winston Salem • Goltra, Inc.

OHIO
Canton • Letherman Seed Company
Cincinnati
• Century Toro Dist. Inc.
• Thorton Wilson
Cleveland
• Sidney L. Dryfoos Co.
• U.S. Garden Sales, Inc.
Columbus
• Century Toro Dist. Inc.
• W. R. Grace & Company
Dayton
• Century Toro Dist. Inc.
Elyria
• Lakeshore Equipment & Supply Co.
Findlay • Desco Chemical, Inc.
Mantua • John R. Skinner Co.
Toledo
• Century Toro Dist. Inc.

OKLAHOMA
Oklahoma City
• Estes Chemicals, Inc.
Tulsa
• All Best, Inc.
• Thompson-Hayward Chemical Co.
• Wait Mfg. & Sales Co.

OREGON
Portland
• The Charles H. Lilly Co.
• Van Waters & Rogers
• Wilbur-Ellis Company

PENNSYLVANIA
Doylestown • Philadelphia Toro
Hanover
• Miller Chemical & Fert. Corp.
Harleysville • Geiger Corporation
Horsham • Pocono Supply Company
Lebanon • Lebanon Chemical Corp.
Malvern • Fisher & Son Co., Inc.
Philadelphia
• Farm & Golf Course Supply Co., Inc.
Phoenixville
• Lawn & Golf Supply
Pittsburgh
• E. H. Griffith, Inc.
• Krigger & Company
Reading • Reading Bone Fertilizer
Wycombe • Histand Supply

RHODE ISLAND
East Providence
• Old Fox Chemical, Inc.

SOUTH DAKOTA
Sioux Falls • C & R Supply Company

TENNESSEE
Knoxville • Regal Chemical Co.
Memphis
• Axon Corporation • Bob Ladd, Inc.
• Oldham Chemical Co., Inc.
• Turf-Aid
Nashville
• Central South Turf Dist.
• Tieco, Inc.

TEXAS
Amarillo • Amarillo Seed House
Dallas
• Chemical & Turf Specialty Co.
• Van Waters & Rogers
El Paso • El Paso Turf Supply
Lubbock
• Williamson Seed Company, Inc.
Paris • Estes Chemical, Inc.
Waco • Estes Chemical, Inc.
Wichita Falls • Estes Chemical, Inc.

UTAH
Orem • Wasatch Chemical Div.
Salt Lake City
• Steve Regan Company
• Wastach Chemical Div.

VIRGINIA
Chesapeake • Turf & Garden Div.
Harrisonburg • Wetsel Seed Company
Richmond
• Richmond Power Equip. Co., Inc.
Roanoke
• Agri-Turf Products Co., Inc.
• Miller Chemical & Fertilizer

WASHINGTON
Kent • Van Waters & Rogers
Renton • Pacific Agro Company
Seattle • The Charles H. Lilly Co.
Tacoma • NuLife Fertilizers

WASHINGTON, D.C.
• Lea's Green Meadows, Inc.

WEST VIRGINIA
Charleston • Youngs, Inc.

WISCONSIN
Chilton • Horst Distributing Co.
Elm Grove
• Reinder Bros. Turf Equipment
Milwaukee
• Loft-Kellogg Seed, Inc.
Sun Prairie
• Turf Management Supply

WT&T

PROSCAPE

By Michael Hurdzan, Ph.D., Kidwell and Hurdzan, Inc.,
golf course architects and consultants.

Q: *Recently I seeded my bent nursery with seed that was certified as Poa annua free, but already I see annual bluegrass plants. Could they have come in with the bentgrass seed even though it was certified as Poa free?*

A: Yes. Seed certification is done to large volumes of seeds called "Lots" which may be as large as a box car load. This means that some unscrupulous seed dealers buy large volumes of seed and may make 150 tests (one gram sample size) on the lot, but need only submit one result for tagging purposes. Thus 149 of the 150 samples could be contaminated and only one test not show impurities; and it is this test result that is attached to the "Lot." Everything is legal and you have no recourse although your seed may have had as much as 80-100 Poa annua seeds per pound. The best insurance against such mistakes is to buy only from reputable seed dealers and send a 25 gram sample, not a one gram sample, to a seed test lab after the seed is delivered to your storage area to insure you have the specified quality. The old adage is "as you sow, so shall you mow."

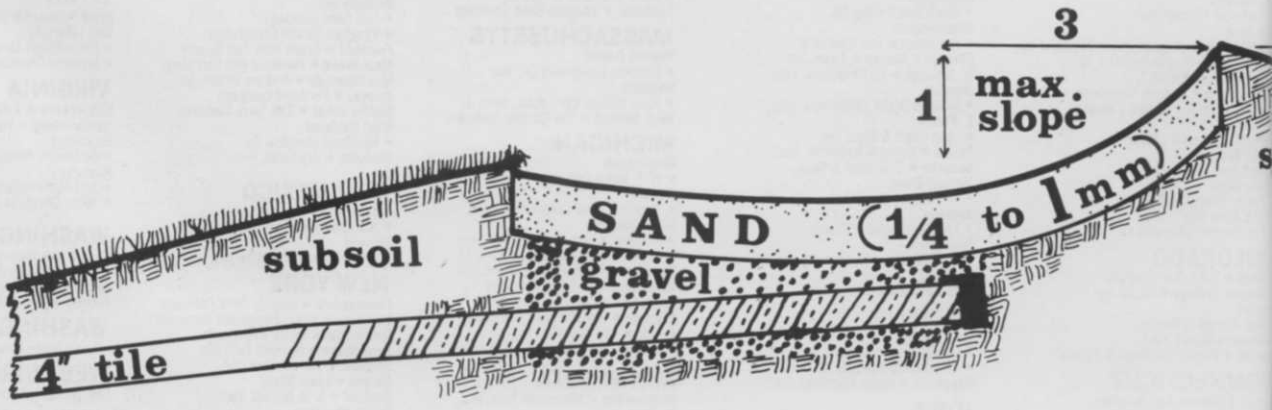
Q: *Our sand traps keep washing out from every rain or even after a heavy irrigation. What can we do to keep the sand in place?*

A: This is a difficult problem unless the sand trap is properly built to begin with. Perhaps by describing how a trap should be built will allow you to make corrections:

1) First the trap edges should be elevated to drain as much water away from the trap as possible. This means the sand trap edge nearest the green might be 6″ higher than the green or surrounding land so that water drains toward the green or a drainage swale.
2) The slope of the trap should be not more than 3:1 to reduce washing of sand off the faces.
3) The depth of sand should be a minimum of 6″ to allow perculation and subsurface movement of water.
4) The sand trap bottoms should be concave and smooth with a stable clay or hard base to facilitate this subsurface water movement.
5) The sand size should be between ¼ to 1 mm. in size to provide a firm but well drained texture.
6) Traps should be tile drained and gravel backfilled to the trap subgrade to remove water that enters the trap.
7) If your membership permits, allow the grass on trap edges to grow a little longer to reduce velocity of water entering the trap.

These suggestions may not result in most artistic traps but they will require less maintenance.

Q: *We plan to do some tile drainage using perforated, flexible, plastic tile and are considering using 2″ tile. Others tell us that we should use nothing smaller than 4″. Which is best?*

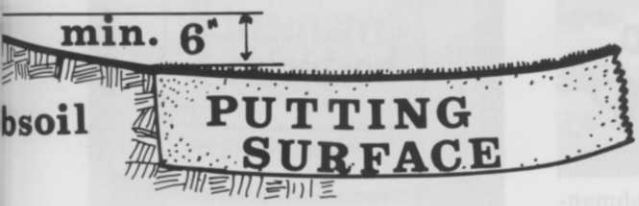


A: I don't believe it is a question of which is best, for most products meet or exceed the A.S.T.M. D 1248 specifications. Rather it is a matter of for what purpose you are using the tile. For PURR-Wick construction I believe Dr. Daniel's design concept is based on 2″ tile. For all other drainage consider the following:

1. The cost of material for 4″ tile is about ⅓ higher than for 2″ tile.
2. However a 4″ tile carries four times the water of a 2″ —
   Area of circle = πr^2 where r = radius
   Area of 2″ tile = $3.14 \times 1^2 = 3.14$ inches^2
   Area of 4″ tile = $3.14 \times 2^2 = 12.56$ inches^2
3. The cost of trenching and laying is only slightly higher for 4″ over 2″.
4. However you have a larger margin of installation error with 4″ tile. A 2″ undulation with 2″ tile may result in a silt trap while it would take a 4″ error before you got a similar result using larger tile. This is most important if the trench bottom is uneven as in rock, or unstable as in mud.

In summary, if the money is available to do the job, the 4″ tile would be the better choice.

PROSCAPE is a free problem solving service for any residential, industrial, and golf course landscaping topic. Write your questions for PROSCAPE on the postpaid reader question card in this issue.



In 2 Minutes... You're Hooked with a "Tow-Boy" Sod Harvester

Operating behind any adequately sized, low speed tractor, the Princeton "Tow-Boy" allows complete flexibility in the use of your power supply...because of its exclusive "2 minute hook-up" capability. Harvest in the morning, mow, seed, and spray in the afternoon.

Save time, money and man hours. Increase production! No large field crew needed. Harvest over 2,000 sq. yds. of sod per hour with three-man crew. All sod is cut, palletized and ready to ship.

Perfect for smaller volume sod producer. Now, **you** can enjoy the high production and labor saving features of the larger Princeton harvesters...at one-third the cost. Ask for the "Tow-Boy" by Princeton.

There's a Princeton for Everyone.

AUTOMATIC

The only sod harvester that does it all...with just one man! Cuts, aerates, crosstie stacks, and palletizes 9,000 sq. yds. of sod per hour with a crew of one. Save time, money, and man hours. For the large volume sod producers who wants to increase production **and** profit—the Princeton "Automatic" Sod Harvester.

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Increase your profits...by reducing costs and increasing production. Three man crew can harvest 7,500 sq. yds. of sod per hour. For the medium to large volume sod producer who wants quality, high production and low maintenance at a moderate price. The Princeton "Self Propelled" Sod Harvester.

For additional information, write or call collect:

Chuck Braun
Sales Manager
955 W. Walnut Street
Canal Winchester, Ohio 43110
614/837-9096

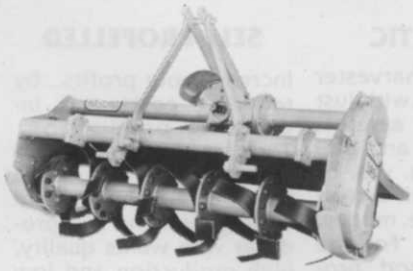
PRINCETON
MANUFACTURING COMPANY
Dealer/Distributor inquiries invited

Circle 127 on free information card

PRODUCTS

DIESEL WHISPER CHIPPER, new from Asplundh Mfg. Div., provides an alternative to gasoline-powered chippers. The model JEY has a 236 cu. in., four-stroke, in-line four-cylinder Perkins diesel engine. The engine is designed for heavy industrial usage and features replaceable cylinder sleeves and pistons. Diesel engines offer fuel savings compared to gasoline units. A noise limiting muffler keeps noise down for work in residential and metropolitan areas. Regular Asplundh features include heavy-duty clutch, tachometer/hour meter, cold start system, dry air cleaner, and a group 4 battery.

Circle 701 on free information card



ROTARY TILLER for small tractors is available from the Maschio Div. of Ferrari International, Inc. Designed for use on tractors ranging from 16 to 50 h.p., the tiller has a four-speed gearbox with easily changeable heavy-duty gears. All rotary shafts are hydrostatically balanced, and all units have over-sized bearings, gears, and shafts. Power is transmitted by an extra large chain. Main shaft bearings are protected from grass, wire, etc., by a patented seal. Maschio engineering gives a low profile and unified double bar construction provides strength and rigidity. The new Model "Super L" is available in 31″, 41″, 51″, 61″ widths. All models feature adjustable depth skids, and contain 6 tines per flange.

Circle 702 on free information card

TRACTOR-DRIVEN TRENCHER designed for simplicity and low maintenance is available from Kraft Inc. The Norway-built Radahl trencher has a unique digging wheel which has 10 easily replaceable teeth. The trencher can dig a ten-in. trench and install clay or concrete pipe or plastic tubing simultaneously. The manufacturer says an 80 h.p., two-wheel tractor can operate the trencher adequately. The rate of installation for pipe is 20 ft./min. and 40 ft./min. for tubing. A slip clutch is incorporated in the trencher to prevent overload. Maximum trench depth is five-ft.

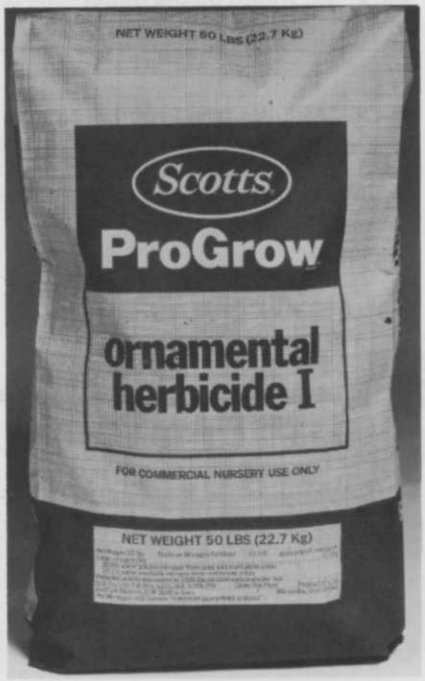
Circle 703 on free information card

UTILITY VEHICLE from Cushman-Ryan features radial frame construction. The one-piece welded frame, skid bars and steel bumper guards are designed to protect the vehicle. Standard features on both the 12- and 18-h.p. models include padded seating, manual three-speed transmission with synchromesh in second and high gear, rear brakes and sealed beam headlight. Options include vented cab with lockable steel doors and an exhaust spark arrestor. Both models have pickup boxes and can carry 1,000 lbs. of payload plus the driver.

Circle 704 on free information card

PORTABLE WHOLE-TREE CHIPPER has been introduced by Strong Mfg. Co. for the municipal, landclearing, and tree service industries. The Trelan C-14 features a 14-in. capacity, a ground-operated knuckle boom loader, and a 100 h.p. six-cylinder, Ford gasoline engine. The new model weighs 10,000 lbs. and measures 13 ft. long, 8 ft. wide, and 9 ft. high.

Circle 705 on free information card



PREEMERGENT ORNAMENTAL HERBICIDE from Scotts is a granular herbicide for preemergence control of grassy and broadleaf weeds around ornamentals. Progrow Ornamental Herbicide I is registered for

the control of annual bluegrass, barnyardgrass, crabgrass, goosegrass, bittercress, common groundsel, dandelion, lambsquarters, oxalis, smartweed, pigweed, purslane, scarlet pimpernel, sheperdspurse, sow thistle and spotted spurge. It may be used on 53 container and field grown ornamentals. The herbicide does not eliminate established weeds and should be applied prior to weed seed germination or after existing weeds have been removed.

Circle 706 on free information card

KENTUCKY 31 FESCUE is now available in newly designed bags from the Midwestern States Fescue Association. The bag has an eye-catching red and green design, lists consumer benefits, and gives detailed planting instructions for both lawn and field use. The tall fescue will be bagged in a variety of sizes.

Circle 707 on free information card

COMPACT CHAIN SAW for tree trimming is available from Husquarna. The Model 38VR has a 2.3 cu. in., 9500 rpm engine and weights 11 lbs. It features Husquarna's anti-vibration system. Chain brake is optional.

Circle 708 on free information card

POWERAKE by F.D. Kees offers new features to safe time and energy. The Model 100528 boasts a centrifugal clutch for easier starting and operator safety, a single-action height adjustment, dual filter air cleaner, and an improved heavy-duty wheel with grease fittings. The Powerake utilizes a 5 h.p. Briggs & Stratton engine, and 28 hardened-steel, self-cleaning fingers to clean a 20-in. swath. The raking assembly is interchangeable with the aerator assembly of the Kees Powerslice.

Circle 709 on free information card

IMPROVED MOWERS by Excel Industries, Inc. feature improved drive train and steering linkage. The Hustler mowers have Kohler engines, heavy-duty air cleaners, adjustable suspension seats, hour meters, engine heat warning lights, seat-actuated engine kill switches, dual hydrostatic drives, and drum park brakes. Four rotary and flail mowing decks are available from 54 to 72 in. wide. A number of attachments are available to increase the mower's usefulness, including a catcher, edger, cultivator, mulcher, dozer blade, snowthrower, broom, cab and trailer.

Circle 710 on free information card

Hypro sprayer pumps

Choose from a wide range of pump designs and materials to suit your requirements: cast-iron, Ni-Resist and bronze pump housings... even nickel plating on piston pumps.

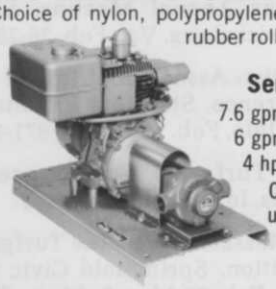
PISTON PUMPS

Series 5200 Big Twin
10 gpm output at 400 psi with 6 hp engine

Series 5400 4-Cylinder
25 gpm output at 600 psi

ROLLER PUMPS

Choice of nylon, polypropylene or rubber rollers.



Series 6500
7.6 gpm at 100 psi
6 gpm at 200 psi
4 hp gas engine
Other models up to 44 gpm at 50 psi.

CENTRIFUGAL PUMPS

Series 9200.
Output to 135 gpm.
Pressures to 180 psi.
Speeds to 6000 rpm.

Write for a FREE Sprayer Pump Handbook

Hypro
A DIVISION OF LEAR SIEGLER, INC.
347 Fifth Ave NW, St. Paul, MN 55112• (612)633-9300

Circle 115 on free information card

EVENTS

National Arborist Association Annual Meeting, Sarasota Hyatt House, Sarasota, Fla., Feb. 19-23, 516/221-3082.

Capital Area Turf School, Hershey Motor Lodge, Hershey, Penn., Feb. 21-22.

Western Pennsylvania Turf School/Trade Show, Howard Johnson Motor Lodge, Monroeville, Penn., Feb. 21-23.

Pest Management Seminar, Target Chemical Co., Anaheim Convention Center, Anaheim, Ca., Feb. 22, 213/921-7707.

Landscape Design Short Course III For Residential Properties, Ohio Agricultural Research and Development Center, Wooster, Ohio, Feb. 23-25, Fred K. Buscher, Area Extension Center, OARDC, Wooster, Ohio 44691.

21st Annual Shade Tree Short Course, Scheman Auditorium, Iowa State University, Ames, Iowa. Feb. 22-23, 515/294-1168.

National Recreation and Parks Association Pacific SW Regional Conference, Fresno, Ca., Feb. 25-28, 414/733-2301.

American Society of Golf Course Architects Annual Meeting, Carefree Inn, Phoenix, Ariz., Feb. 26-Mar. 3, 312/372-7090.

International Society of Arboriculture, Southern Chapter Annual Meeting, Sheraton Motor Inn, Fredericksburg, Va., Feb. 26-28.

Irrigation Association Annual Irrigation Technical Conference, Stouffers Cincinnati Towers, Cincinnati, Ohio, Feb. 26-28, 301/871-1200.

Iowa Turfgrass Conference, Hilton Inn, Des Moines, Iowa, Feb. 27-Mar. 1.

47th Massachusetts Fine Turfgrass Conference and Exhibition, Springfield Civic Center, Springfield, Mass., Feb. 28-Mar. 2, Mass. Turf and Lawn Grass Council, P. R. Scagnetti, The Clapper Co., 1121 Washington St., W. Newton Mass. 02165.

Northeastern Pennsylvania Turf School, Master Host Inn, Wilkes-Barre, Penn., Feb. 28.

"Tree Stresses" Short Course, University of Missouri-Columbia, Feb. 28-Mar. 1, John P. Slusher, 314/882-4444.

29th Annual Canadian Turfgrass Show, Canadian Golf Superintendents Association, Hotel Toronto, Toronto, Ontario, Canada, Mar. 5-8, 416/767-2550.

Wisconsin Landscape Federation 1978 Conference, Concourse Hotel, Madison, Wis., Mar. 5-6.

Eighth Vertebrate Pest Conference, Red Lion Motor Inn, Sacramento, Ca., Mar. 7-9, Dr. Dale A. Wade, Program Chairman, 554 Hutchison Hall, University of California, Davis, Ca. 95616.

Nassau-Suffolk Landscape Gardeners Association 10th Annual Turf Conference, Salisbury Park, East Meadow, Long Island, N.Y., Mar. 7.

National Recreation and Parks Association Southwest Regional Conference, Albuquerque, N.M., Mar. 12-14, 202/525-0606.

Midwest Regional Turf Conference, Midwest Regional Turf Foundation, Stewart Center, Purdue University, W. Lafayette, Ind., Mar. 13-15, 317/749-2891.

Western Society of Weed Science Annual Meeting, Nugget Motel and Convention Center, Reno, Nev., Mar. 14-16.

Northcentral Pennsylvania Turf School, Holiday Inn, Bradford, Penn., Mar. 21.

West Virginia Weed Control Association Annual Meeting, Holiday Inn No. 2, Charleston, W. Va., Mar. 28-29, W. Va. Weed Control Assoc., P.O. Box 1986, Charleston, W. Va., 25327

National Recreation and Parks Association Southern Regional Conference, Biloxi, Miss., Apr. 2-4, 202/525-0606.

Williamsburg Garden Symposium, Williamsburg, Va., Apr. 2-5, 804/229-1000 Ext. 2365.

National Recreation and Parks Association Pacific NW Regional Conference, Yakima, Wash., Apr. 8-12, 202/525-0606.

American Horticultural Society Spring Symposium, Mills Hyatt House, Charleston, S.C., Apr. 9-12, 703/768-5700.

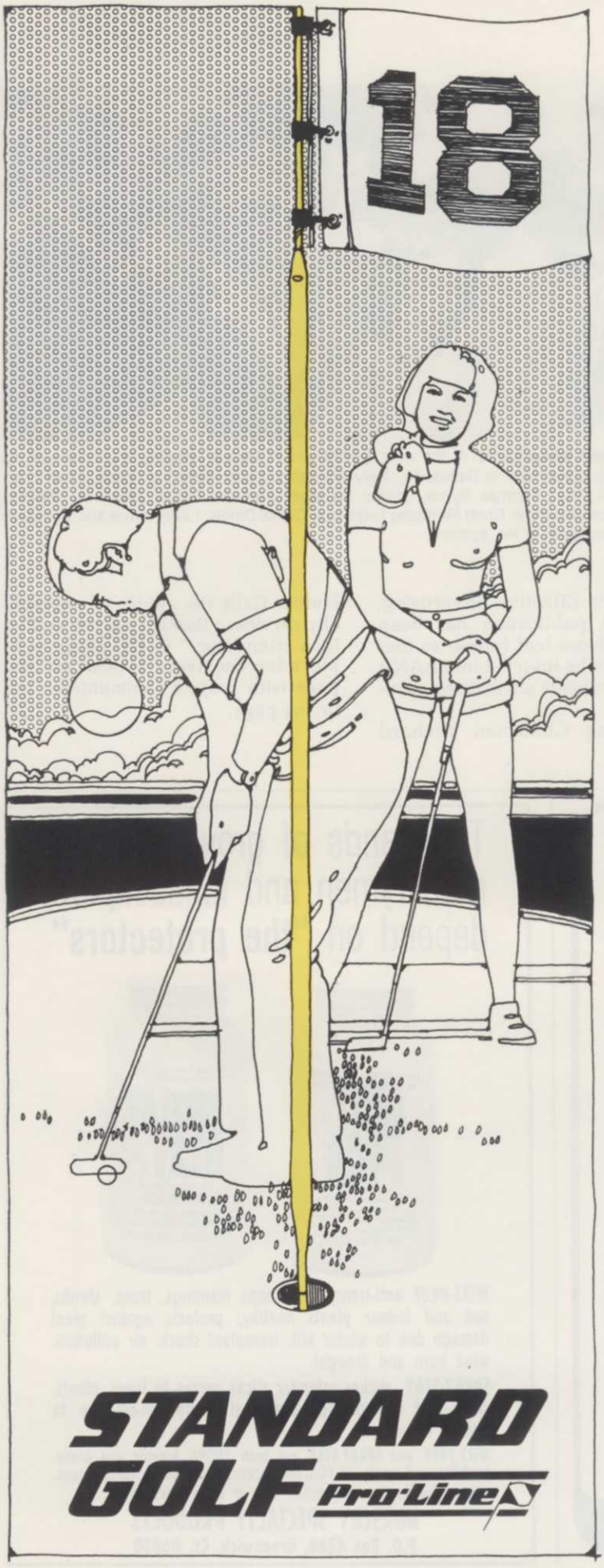
Pennsylvania Recreation and Park Society 31st Annual Conference, Downingtown Inn, Downingtown, Penn., Apr. 9-12, Robert Griffith, 814/865-1851.

ALCA Interiorscape Symposium, Hyatt Regency O'Hare, Chicago, Ill., Apr. 20-21, 703/893-5440.

Canadian Land Reclamation Association Third Annual General Meeting, Sudbury, Ontario, Canada, May-29-June 1, Canadian Land Reclamation Association, Box 682, Guelph, Ontario, Canada N1H 6L3.

American Sod Producers Association Summer Convention & Field Days, Sheraton-Spokane, Spokane, Wash., July 19-21, 402/463-5691.

ALCA Reclamation/Erosion Control Symposium, Marriott Hotel, Denver, Colo., Aug. 3-4, 703/893-5400.



Flag Poles of all types only from Standard!

Nobody but nobody offers such a wide selection of quality poles — in so many types — and colors.

4 proven-popular kinds to choose from! Flex-King, Royaline and Tournament Poles in high-grade, weather-proof fiberglass; Slim Line poles in super-strong, heat-treated aluminum.

Select from tapered and untapered types - in 5-foot through 10-foot lengths.

Colors? Standard can furnish any color combination to fit your needs.

Standard's New Snap-Lock Flag Swivel. Nylon snaps eliminate tying. Float up and down on metal rod to fit any flag.

Simply contact your local Standard Distributor. Or write: **Standard Golf Company, 220 East Fourth Street, Cedar Falls, Iowa 50613, (319/266-2638).**

Why not order all of your poles, flags and cups from Standard Golf — today?

GREEN INDUSTRY NEWS

Continued from page 14

says the attorneys, "it appears that dispute-settling policies vary from bank to bank; however, there is some risk to the seller in any credit card transaction where the seller incurs expenses before delivery."

Favoring credit extension by nursery retailers, the AAN suggest that requiring a cash deposit in these cases might be a possible solution. In this manner, the retailer could cover possible loss if the order were cancelled.

The author and consultants of the new *Turf Irrigation Manual* display their book at an announcement dinner held in Dallas, Tx. They are (left to right) Joseph A. Lane, Chief Engineer, AMTROL, Inc.; Thomas Byrne, District Manager, Peerless Pump; James A. Watkins, Author; and Don Campbell, Chief Plumbing Inspector, City of Dallas. Lane, Byrne and Campbell served as consultants to the author.

Nurserymen publish advertising guide

The American Association of Nurserymen has just released its 1977 Guide to Effective Advertising. The annual publication has been changed to loose-leaf format so that the guide can be inserted into AAN's Partners for Profit advertising manual.

Marketing Chairman Richard Hutton Calls the guide, "a valuable clip service, a thought starter, and an idea stimulator." In the guide sample advertisements appear on one page with judge's comments on the facing page.

NEW! 48"

KEES HEAVY-DUTY

POWERMOW

Model 481100

For large residential and commercial grounds use.

CHECK THESE PERFORMANCE FEATURES:

■ Powerful 11 h.p. Briggs & Stratton synchro-balanced engine ■ Fingertip clutch, brake and power turning control levers on each handle ■ Sleek deck design and drum wheel brakes for positive, close quarter mowing ■ Unique V-flanged front deflectors help prevent damage to yard decorations, monuments, etc. ■ Baffled design for clean and safe grass discharge. OPTIONS: Riding sulky and metal grass catcher.

For more information, write P.O. Box 902 or phone (402) 223-2391.

Since 1874

F. D. KEES MFG. CO. Beatrice, Nebr. 68310

Circle 103 on free information card

Thousands of growers, nurserymen and landscapers depend on **"the protectors"**

WILT-PRUF anti-transpirant keeps plantings, trees, shrubs, sod and indoor plants healthy; protects against plant damage due to winter kill, transplant shock, air pollution, wind burn and drought.

SPRAY-STAY, sticker-extender sticks sprays to trees, plants, crops and turf protecting against costly run-off due to rain or irrigation.

WILT-PRUF and **SPRAY-STAY** are both 100% organic and biodegradable and meets all FDA specifications for use on edible crops.

For further information call or write Dep't. WTT

NURSERY SPECIALTY PRODUCTS

P.O. Box 4280, Greenwich, CT. 06830

Circle 132 on free information card

SOIL

Flooding can cause damage from gas

Damage to crops is known to occur from flooding as a result of decreased amounts of oxygen, however under certain conditions the flooding damage may be related to a gas that is highly deleterious to certain plant roots, U.S. Department of Agriculture (USDA) scientists say.

Patrick G. Hunt and Robert B. Campbell, soil scientists with the USDA Agricultural Research Service (ARS), said that under certain conditions, particularly in the humid southeast, flooded conditions can result in the production of high concentrations of ethylene gas.

Ethylene is a highly volatile gas that acts somewhat like a hormone on a number of plant physiological processes and can be quite harmful at high concentrations.

The scientists, working at the ARS Coastal Plains Soil and Water Conservation Research Center at Florence, S.C., found that ethylene production was increased by additions of organic matter to the soil in addition to being highly related to the oxygen level and moisture content of soils. Soil compaction and physiochemical conditions also appear to be related to ethylene production.

Efforts are continuing to determine the extent of ethylene damage as a practical agricultural problem and to obtain a more detailed understanding of its production in the soil.

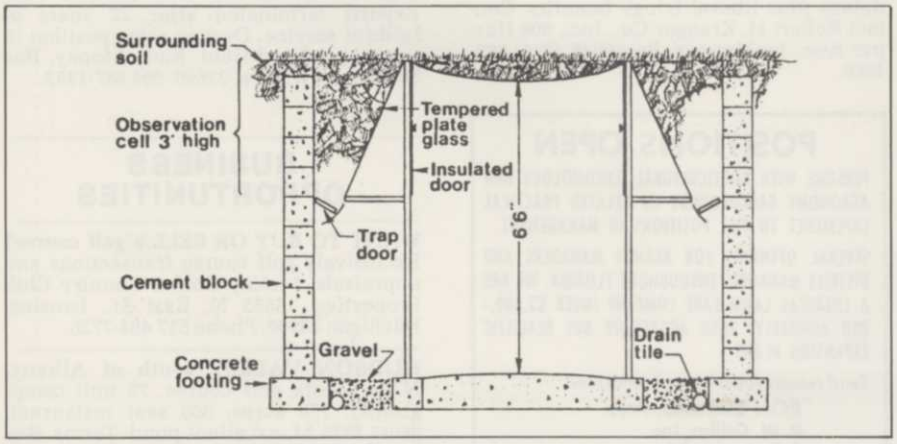
WEEDS

SWSS probes cost, benefit of herbicides

The Southern Weed Science Society (SWSS) held its 31st annual meeting January 17, 18 and 19 in New Orleans. The meeting was attended by more than 1,000 representatives from industry as well as scientists, students and producers interested in this annual exchange of information on scientific research into weed control.

The opening session aired several views of the 1978 theme "Herbicides: The cost/benefit ratio" including those of Charles Gilbert of Diamond Shamrock, representing the manufacturer; Warren Shaw of the U. S. Department of Agriculture, Agricultural Research Service, representing the public view; and George Mitchell of M & M Air Service, representing the user.

New officers of the SWSS announced at the business meeting include Cleston G. Parris, Tennessee Farmers Cooperative, at LaVergne, Tn., president; Morris G. Merkle, Texas A & M University, College Station, president-elect; Charles E. Moore, Lilly Research Laboratory, Memphis, Tn., vice-president; and John Abernathy, Texas A & M University, Lubbock, secretary-treasurer.



A turfgrass rhizotron (subterranean laboratory), scheduled for completion by next spring at Ohio State University, will allow scientists to monitor roots through observation windows. Instruments will allow 24-hour monitoring of radiation levels, relative humidity, rainfall and wind velocity and direction. An extensive series of thermocouples will be used to monitor soil, leaf, canopy and air temperatures.

the Reinco power team

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When answering ads where box number only is given, please address as follows: Box number, c/o Weeds Trees and Turf, Dorothy Lowe, Box 6951, Cleveland, Ohio 44101.

Rates: All classifications 65¢ per word. Box number, $1. All classified ads must be received by Publisher the 5th of the month preceding publication date and be accompanied by cash or money order covering full payment. Mail ad copy to: Dorothy Lowe, Weeds, Trees & Turf, P.O. Box 6951, Cleveland, Ohio 44101.

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Continues on page 77

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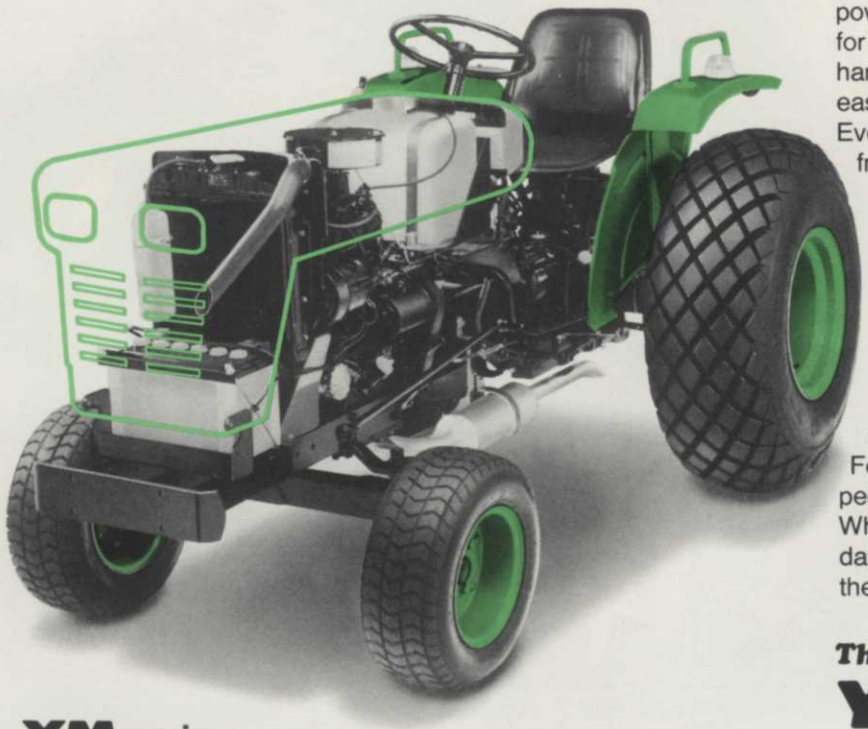

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Continued from page 74

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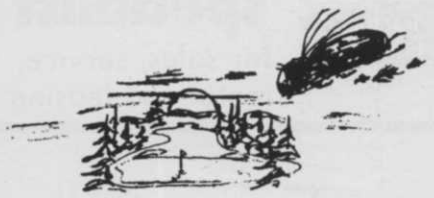

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